



NCC LP0002

CERTIFICATION TEST REPORT

FOR

產品名稱： WiGig Module

MODEL NUMBER: QCA9008-SBD1

REPORT NUMBER: 15U20374-E7, Revision E

ISSUE DATE: OCTOBER 15, 2015

Prepared for

申請者：台灣高通股份有限公司
製造商：Qualcomm Atheros, Inc.
(300) 新竹市公道五路二段 101 號 6 樓

Prepared by

**UL VERIFICATION SERVICES INC
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/02/2015	Initial Issue	M. Heckrotte
A	08/14/2015	Update Address and Add photos	S. Kuwatani
B	09/15/2015	Update Reference and Add Notes	C. Cheung
C	09/18/2015	Revised EUT Photos	S. Kuwatani
D	09/23/2015	Revised EUT Description from Wi-Fi+BT+WiGig Module to WiGig Module	S. Kuwatani
E	10/15/2015	Update Section 1 and Section 6 covering test date and equipment.	S. Aguilar

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	5
4.1. MEASURING INSTRUMENT CALIBRATION	5
4.2. MEASUREMENT UNCERTAINTY.....	5
5. EQUIPMENT UNDER TEST	6
5.1. DESCRIPTION OF EUT	6
5.2. OUTPUT POWER.....	6
5.3. DESCRIPTION OF AVAILABLE 60G ANTENNAS.....	6
5.4. SOFTWARE AND FIRMWARE.....	6
5.5. WORST-CASE CONFIGURATION AND MODE.....	6
5.6. DESCRIPTION OF TEST SETUP.....	7
6. TEST AND MEASUREMENT EQUIPMENT	9
7. APPLICABLE LIMITS AND TEST RESULTS	10
7.1. 6 dB BANDWIDTH.....	10
7.2. 99% and 26 dB BANDWIDTH.....	13
7.1. POWER DENSITY.....	16
7.2. PEAK OUTPUT POWER	24
RESULTS	24
7.3. FREQUENCY STABILITY.....	25
7.4. TX SPURIOUS EMISSIONS.....	28
7.4.2. Spurious Emissions 30 MHz TO 1 GHz	29
7.4.3. Spurious Emissions 1 TO 18 GHz.....	32
7.4.4. Spurious Emissions 18 to 26 GHz.....	41
7.4.5. Spurious Emissions 26 TO 40 GHz.....	44
7.4.6. Spurious Emissions 40 TO 200 GHz.....	47
7.5. AC POWER LINE CONDUCTED EMISSIONS	48
8. GROUP INSTALLATION.....	52
9. TRANSMITTER IDENTIFICATION	53
10. RF EXPOSURE.....	54
11. SETUP PHOTOS	56

1. ATTESTATION OF TEST RESULTS

申請廠商： 台灣高通股份有限公司
製造廠商： Qualcomm Atheros, Inc.
申請廠家地址： (300) 新竹市公道五路二段 101 號 6 樓
廠牌： Qualcomm Atheros

EUT DESCRIPTION: WiGig Module
MODEL: QCA9008-SBD1
SERIAL NUMBER: 1351300100, 1351300114
DATE TESTED: MAY 18 - JUNE 20, 2015

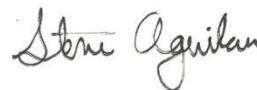
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
NCC LP0002: June 2011	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

Tested By:



MICHAEL HECKROTTE
PRINCIPAL ENGINEER
UL Verification Services Inc.

STEVE AGUILAR
WISE ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC KDB 200443 Millimeter Wave Test Procedure, and NCC LP0002: 6-28-2011.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☒ Chamber B	☐ Chamber E
☐ Chamber C	☒ Chamber F
	☐ Chamber G

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	±3.52 dB
Radiated Disturbance, 30 to 1000 MHz	±4.94 dB
Radiated Disturbance, 1 to 6 GHz	±3.86 dB
Radiated Disturbance, 6 to 18 GHz	±4.23 dB
Radiated Disturbance, 18 to 26 GHz	±5.30 dB
Radiated Disturbance, 26 to 40 GHz	±3.23 dB
Radiated Disturbance, 40 GHz above	±3.50dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

QCA9008-SBD1 is a wireless module that operates in the 60 GHz frequency band which supports 802.11ad.

The QCA9008-SBD1 module consists of two boards, the base-band board and the 60GHz WiGig RF + integral antenna array board. The two boards are connected by a coax cable.

5.2. OUTPUT POWER

The antenna is integral thus radiated measurements are made. The EIRP was measured at the worst-case condition, thus the EIRP measurement conditions correspond to the maximum EUT antenna gain. Therefore the maximum antenna gain is used to calculate the Peak Output Power.

The highest peak output power is 25.2 dBm (331.1 mW).

5.3. DESCRIPTION OF AVAILABLE 60G ANTENNAS

The antenna is an integral phased-array antenna with a maximum gain of 14 dBi.

Antenna Configuration: 32 Antenna Elements
 Patch and End Fire Antenna Elements

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was rev 2.0

The test utility software used during testing was DMTools v1.2 Build 5500,
Devmon Utility ver 1.0.0.11 marlon, Falcon Gui 2014.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate is determined to be MCS7 for Channel 1 and MCS 12 for Channel 2 and 3 as specified by the applicant.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
Laptop	HP	8440p	CZC0457V8C
Laptop Power supply	HP	608425-003	WBGSV0AAR0L5U8
Wilocity PCI card with ribbon	Qualcomm	LABPCB006ECARD-0066	740910061506
mPCIe Extender	Qualcomm	W0060	00601010023

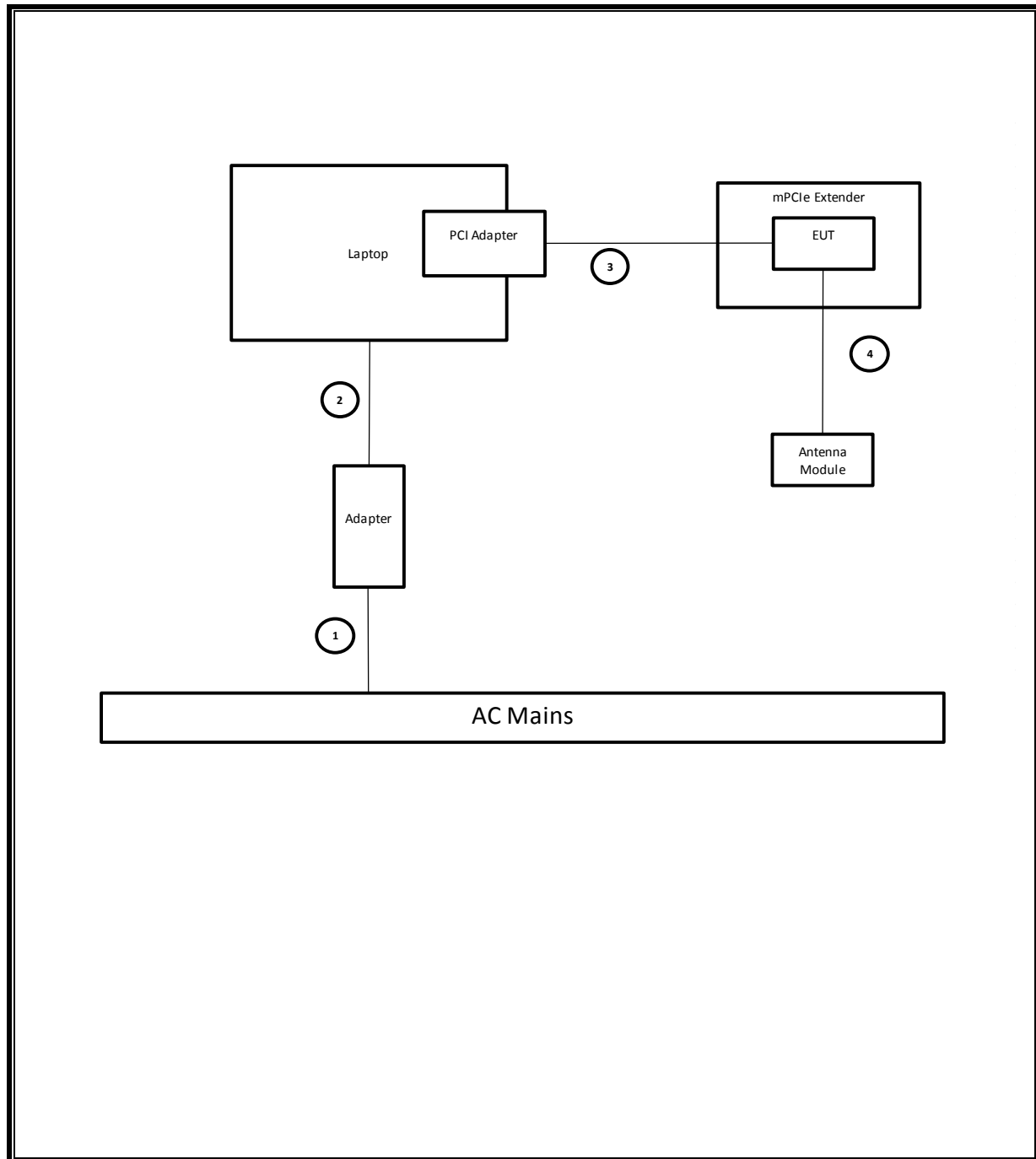
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	0.9m	None
2	DC	1	DC	Shielded	1.6m	Ferrite on DC end
3	Data	1	Signal	Shielded - Ribbon	71cm	None
4	RF	1	U.FL-R	Shielded	55cm	None

TEST SETUP

A laptop computer was utilized to adjust the EUT for testing purposes. Connection to the EUT was by the use of a PCI Card adapter and mPCIe Extender exclusive for testing only.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List					
Description	Manufacturer	Model	S/N	Local ID (T No.)	Cal Due
N9030A PXA Signal Analyzer	Agilent	N9030A	MY52350427	313	9/13/2015
Analog Signal Generator, 40 GHz	Agilent	E8257D	MY48050681	181	9/26/2015
Down Converter, 67 GHz	Agilent	MT-463	12020	499	CNR
mmWave Source 50 - 75 GHz	OML	S15MS-AG	80708-4	613	CNR
Mixer Diplexer for HP	OML	DPL.313B	N02429	52	CNR
Harmonic Mixer , 50 to 80 GHz	Agilent	M1970V	MY51390830	994	6/18/2015
Harmonic Mixer , 75 to 110 GHz	Agilent	M1970W	MY51430784	993	6/12/2015
Harmonic Mixer, 90 to 140 GHz	OML	M08HWA	F90519-2	50	6/17/2015
Harmonic Mixer, 140 to 220 GHz	OML	M05HWA	G90519-1	51	6/17/2015
Spectrum Analyzer	Agilent	8564E	3943A01643	106	8/6/2015
Horn Antenna, 18 to 26.5GHz	ARA	MWH-1826/B	1049	89	12/17/2015
PreAmplifier, 1-26.5GHz	Agilent	8449B	3008A04710	404	4/13/2016
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	924343	88	4/7/2016
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	1029	90	7/15/2015
Oscilloscope 1GHz 4 Ch DSO	Agilent	DSA90804A	MY51420139	215	6/11/2015
Low Pass Filter, 10MHz	Solar Electronics	6623-10	136101	417	5/4/2016
Low Noise Amplifier	VIVatech	VTLN-018-FB	51	CNR	CNR
Waveguide switch	mi-Wave	530V387	1332	CNR	CNR
MM-Wave Isolator	Millitech	FBI-15-RSES0	1734	CNR	CNR
50-75GHZ RF Detector	Millitech	DET-15-RPFWI	41	CNR	CNR
Spectrum Analyzer, 44 GHz	Agilent	N9030A	MY53311010	905	5/17/2016
Antenna, Horn, 18 GHz	ETS Lindgren	3117	164318	862	4/30/2016
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB3	A051314-2	899	4/27/2015 *
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	1818464	491	4/25/2016
Preamp, 1000MHz	Sonoma	310N	325188	834	2/14/2016
Amplifier, 10KHz to 1GHz, 32dB	Agilent	8447D	2944A06550	15	8/16/2015
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	A092308	185	2/18/2016
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent	E4446A	US42510266	99	6/3/2015
Antenna, Horn 1-18GHz	ETS Lindgren	3117	29301	119	1/15/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1782153	931	6/23/2015
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	100935	284	9/6/2015
LISN, 30 MHz	FCC	50/250-25-2	114	24	1/6/2016
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SC/TWC	ZP131613	754	9/30/2015
True RMS Multimeter	Fluke	26III	74320701	297	4/16/2016
Power supply AC, 264Vac 19.5Amp 2500VA 47-63Hz	Elgar-Ametek	CW2501M	1307A03505	350	CNR
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Conducted Software	UL	UL EMC	Ver 9.5, May 17, 2012		

* Equipment used before due date.

Note: Unless specified otherwise, all applicable equipment is calibrated annually.

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. 6 dB BANDWIDTH

APPLICABLE RULE

LP0002, Section 3.13.1 (3.3) For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6dB below the maximum radiated power spectral density in the band, as measured with a 100kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g. for frequency hopping devices).

LIMIT

None; for reporting purposes only.

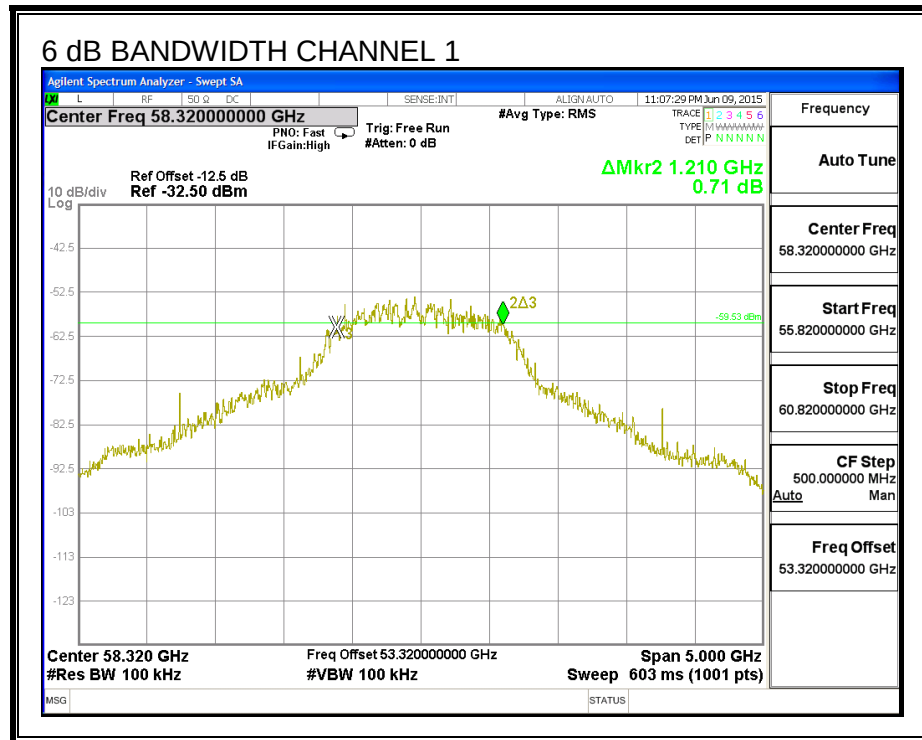
TEST PROCEDURE

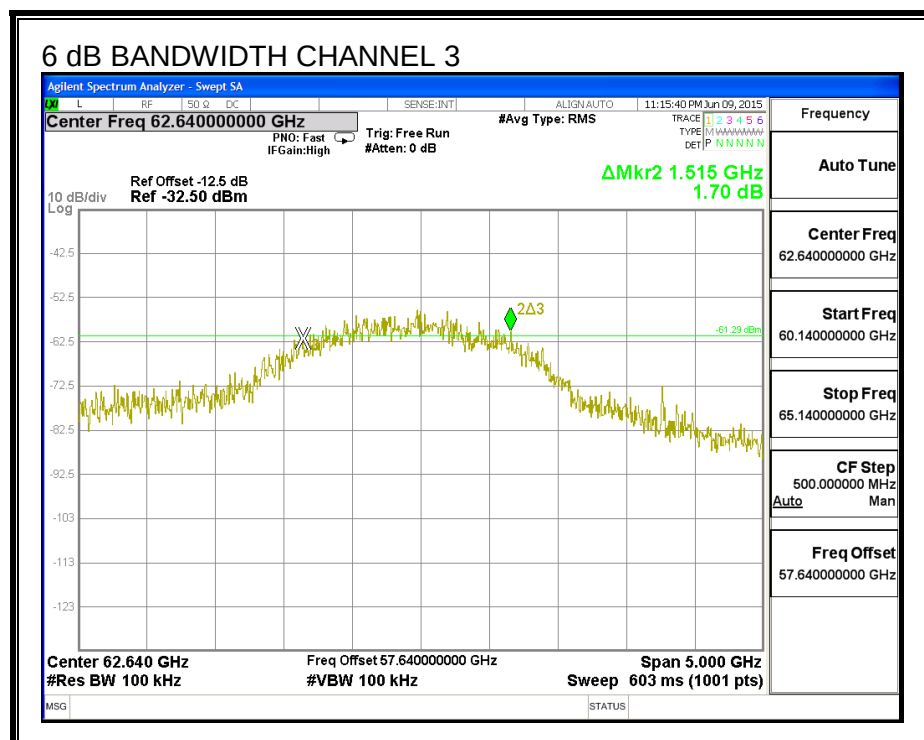
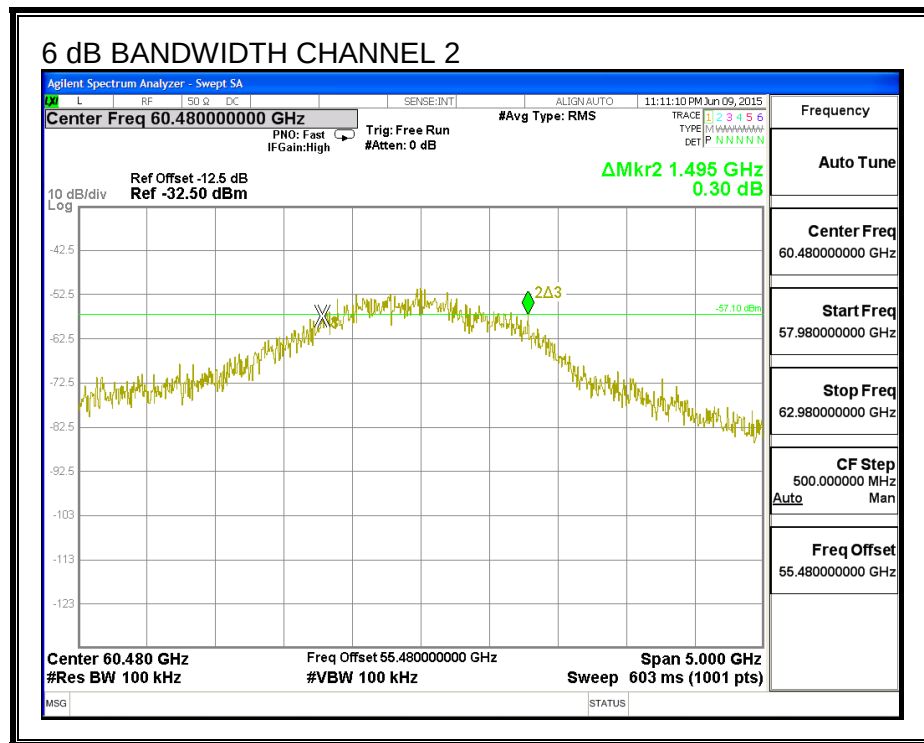
The spectrum analyzer and external mixer are set up to measure the radiated output of the transmitter.

RESULTS

Channel	Frequency (GHz)	6 dB Bandwidth (MHz)
1	58.32	1210
2	60.48	1495
3	62.64	1515

6 dB BANDWIDTH





7.2. 99% and 26 dB BANDWIDTH

APPLICABLE RULE

As referenced by FCC KDB Publication 200443, Millimeter Wave Test Procedures

LIMIT

None; for reporting purposes only.

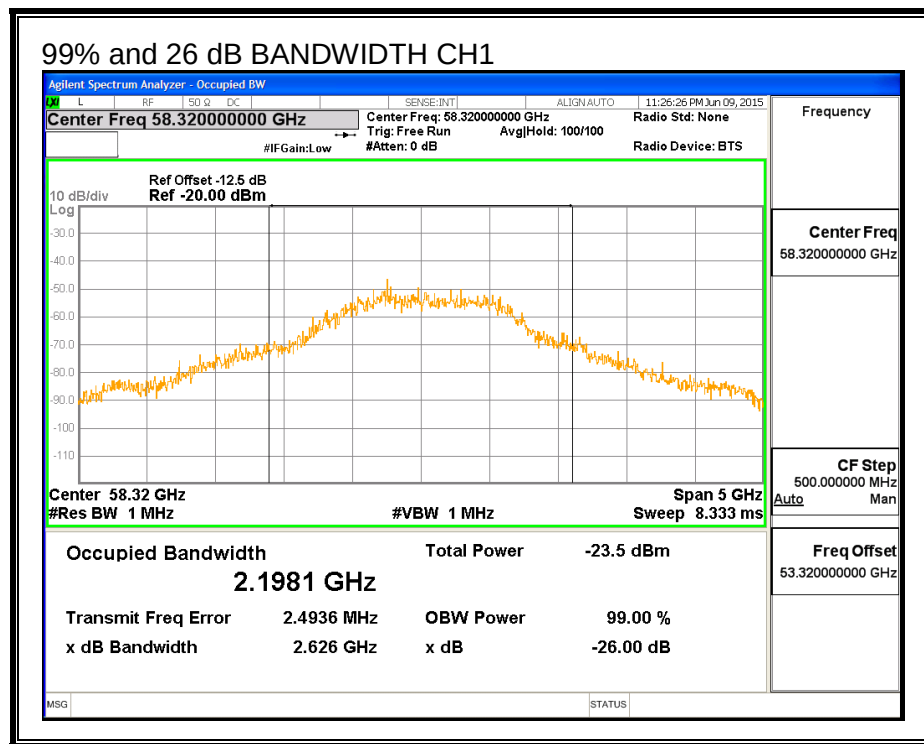
TEST PROCEDURE

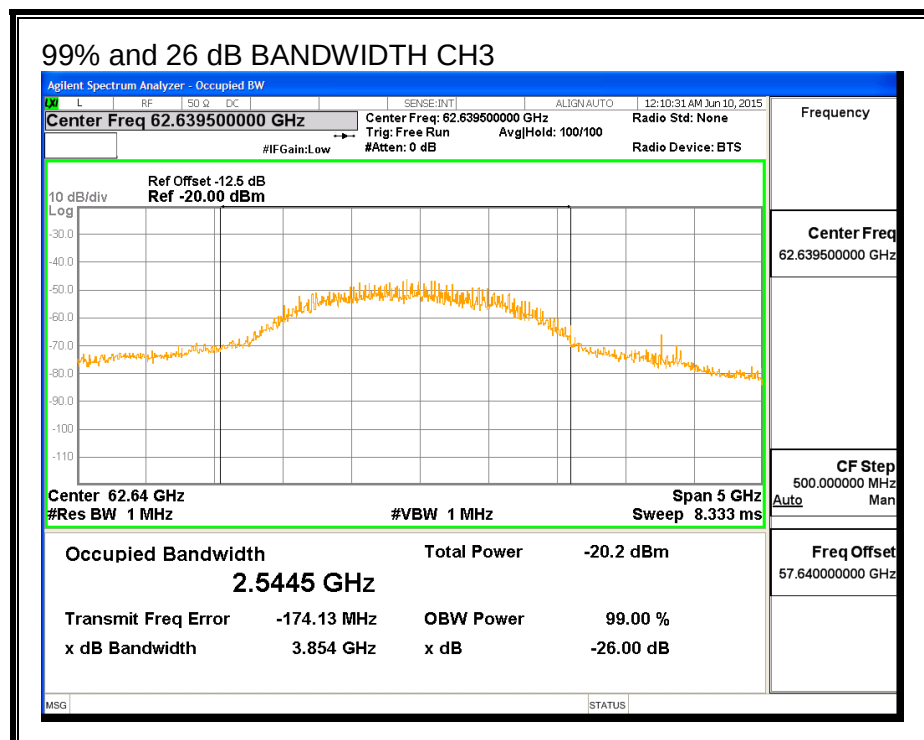
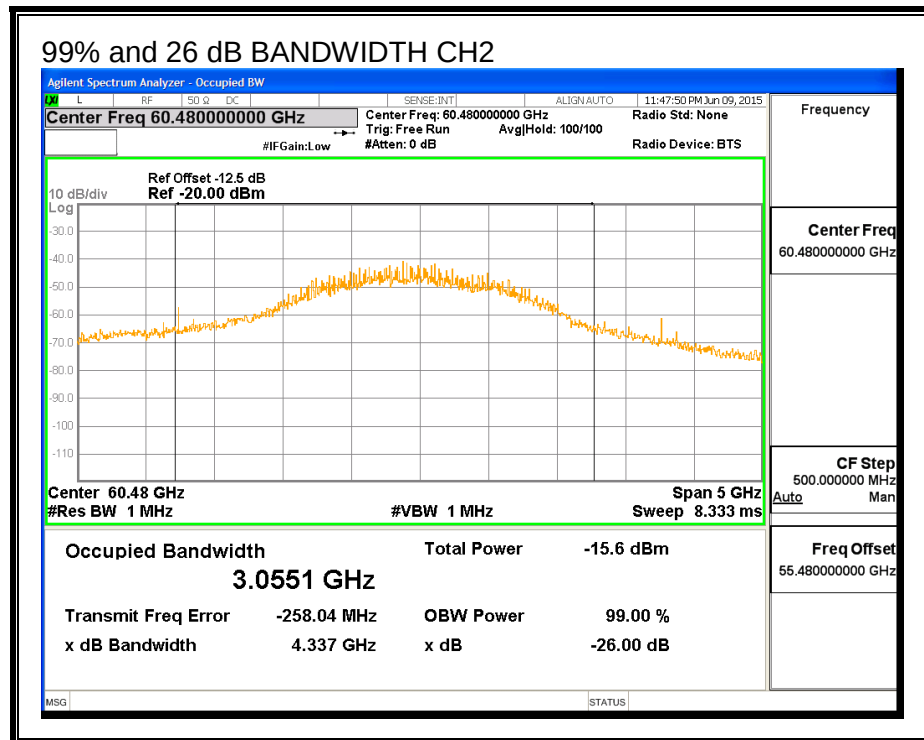
The spectrum analyzer and external mixer are set up to measure the radiated output of the transmitter.

RESULTS

Channel	Frequency (GHz)	99% Bandwidth (GHz)	26 dB Bandwidth (GHz)
1	58.32	2.1981	2.6260
2	60.48	3.0551	4.3370
3	62.64	2.5445	3.8540

99% and 26 dB BANDWIDTH





7.1. POWER DENSITY

LIMIT

LP0002, Section 3.13.1 (1) Within the 57-64 GHz band, emission levels shall not exceed the following:

- (1.1) (The average power density of any emission, measured during the transmit interval, shall not exceed $9 \mu\text{W}/\text{cm}^2$, as measured 3 meters from the radiating structure; and the peak power density of any emission shall not exceed $18 \mu\text{W}/\text{cm}^2$, as measured 3 meters from the radiating structure.
- (1.2) The average emission levels shall be calculated, based on the measured peak levels, over the actual time period during which transmission occurs.
- (1.3) Peak power density shall be measured with an RF detector that has a detection bandwidth that encompasses the 57-64GHz band and has a video bandwidth of at least 10MHz, or using an equivalent measurement method.

Per FCC KDB Publication 200443, Millimeter Wave Test Procedures, If the emission under investigation is not pulsed, then the average levels may be measured by using a video filtering technique (i.e., VBW $\ll$ RBW).

TEST PROCEDURE

Measurements are made at a distance greater than or equal to the far field boundary distance.

The peak power is measured by integrating the spectral envelope over the 26 dB EBW.

The measured power level is converted to EIRP using the Friis equation:

$$\text{EIRP} = P_T * G_T = (P_R / G_R) * (4 * \pi * D / \lambda)^2$$

where:

G_R is the gain of the receive measurement antenna

D is the measurement distance

λ is the wavelength

The EIRP is converted to Power Density using the equation:

$$P_D = \text{EIRP} / (4 * \pi * D_S^2)$$

where:

D_S is the specification distance

Note: Calculations were made in the log form equivalent to the linear form listed above

FAR FIELD BOUNDARY CALCULATIONS

The far-field boundary is given in FCC KDB Publication 200443 as:

$$R_{\text{far field}} = (2 * L^2) / \lambda$$

where:

L = Largest Antenna Dimension, including the reflector, in meters

λ = wavelength in meters

Frequency (GHz)	L (m)	Lambda (m)	R (Far Field) (m)
58.32	0.01924	0.0051	0.14
60.48	0.01924	0.0050	0.15
62.64	0.01924	0.0048	0.15

PEAK POWER DENSITY RESULTS

PEAK POWER DENSITY-CH1

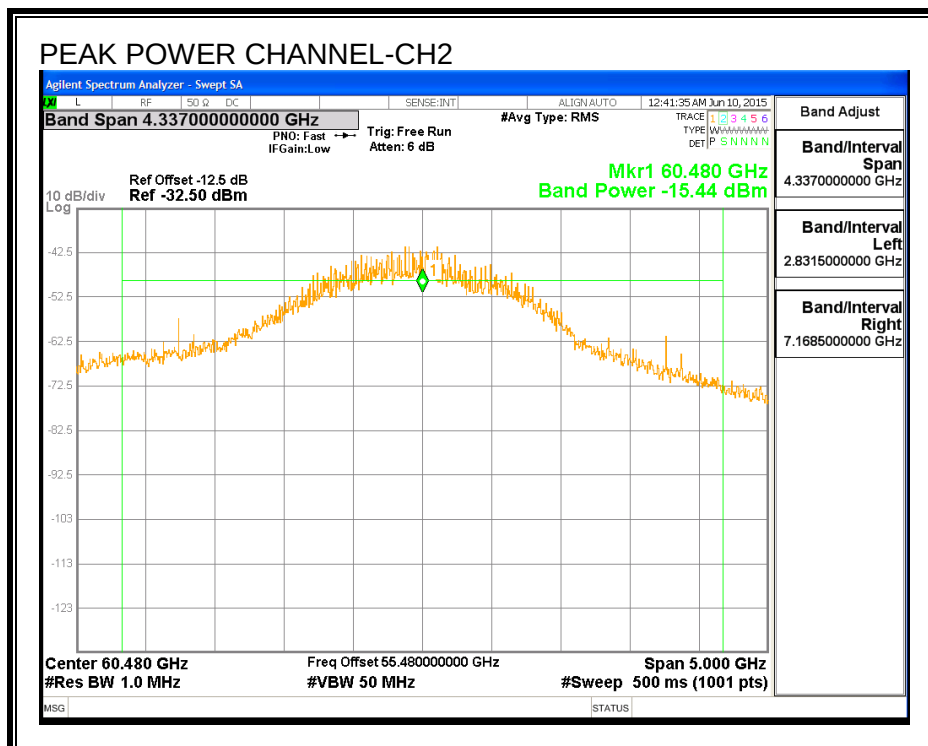
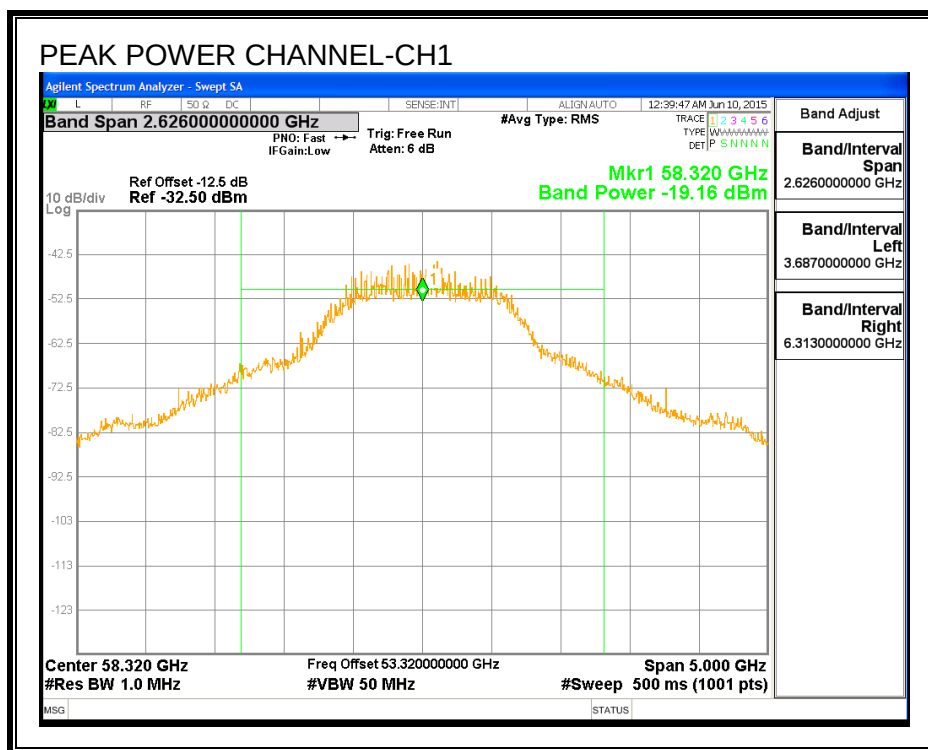
Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
58.32	3.00	-19.16	23.00	35.1
EIRP (W)	Specification Distance (m)	Power Density (W/m²)	Power Density (uW/cm²)	Peak Limit (uW/cm²)
3.263	3.0	0.0289	2.89	18

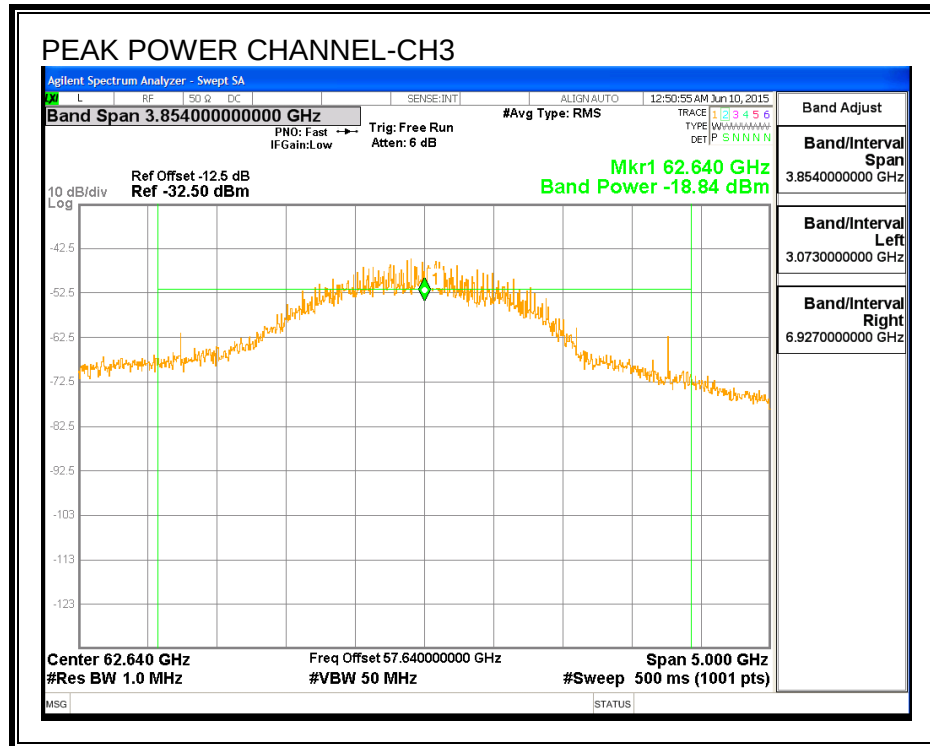
PEAK POWER DENSITY-CH2

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
60.48	3.00	-15.44	23.00	39.2
EIRP (W)	Specification Distance (m)	Power Density (W/m²)	Power Density (uW/cm²)	Peak Limit (uW/cm²)
8.265	3.0	0.0731	7.31	18

PEAK POWER DENSITY-CH3

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
62.64	3.00	-18.84	23.00	36.1
EIRP (W)	Specification Distance (m)	Power Density (W/m²)	Power Density (uW/cm²)	Peak Limit (uW/cm²)
4.052	3.0	0.0358	3.58	18





AVERAGE POWER DENSITY RESULTS

AVERAGE POWER DENSITY-CH1

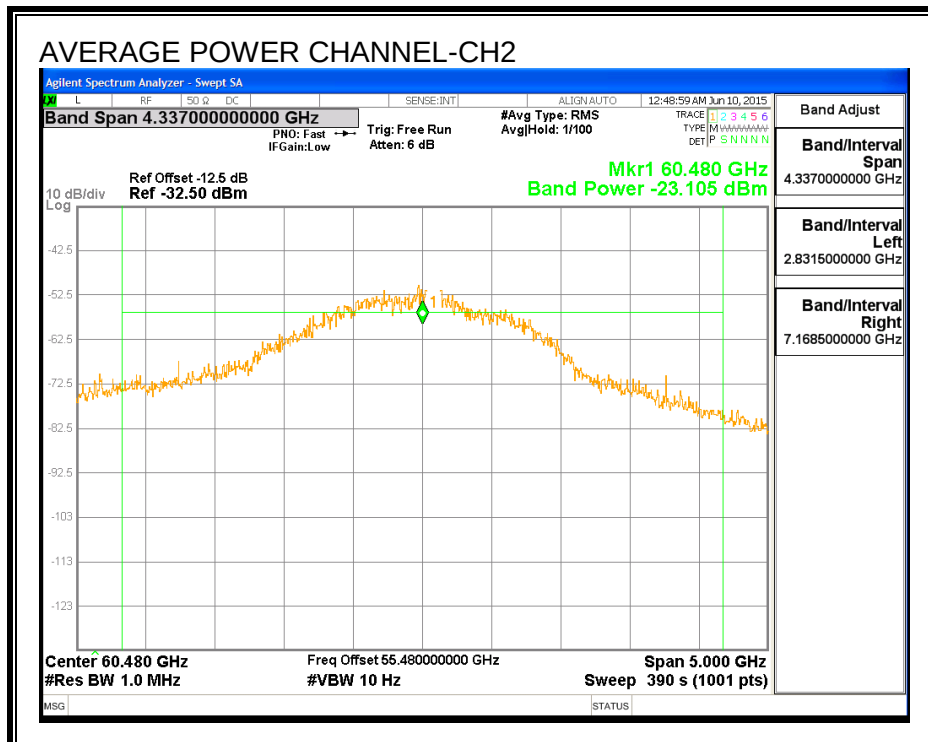
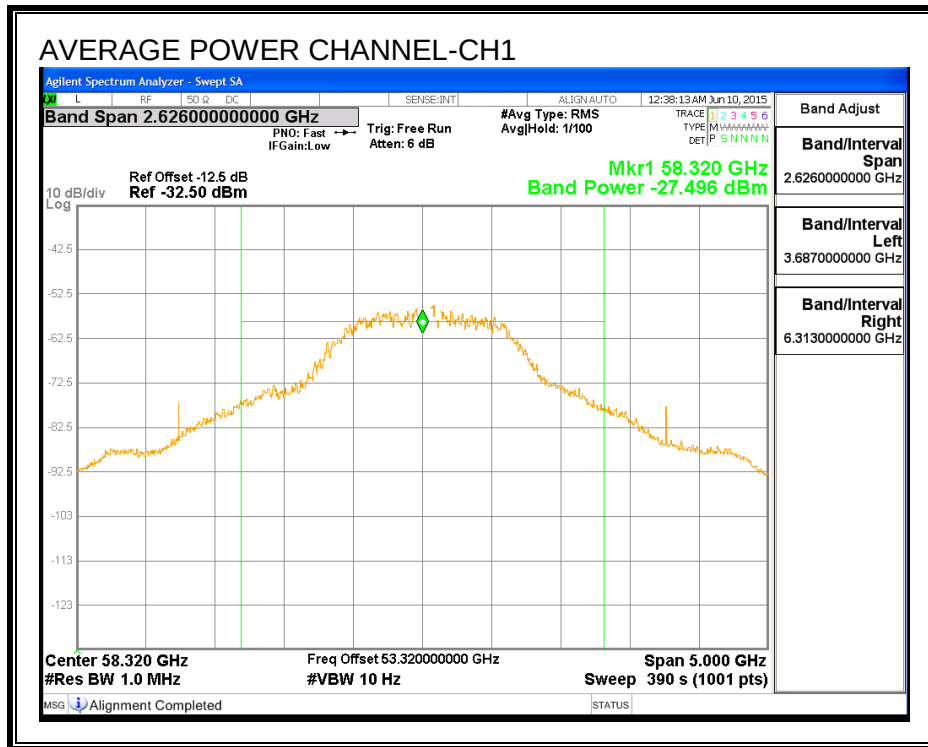
Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
58.32	3.00	-27.50	23.00	26.8
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (uW/cm ²)	Average Limit (uW/cm ²)
0.479	3.0	0.0042	0.42	9

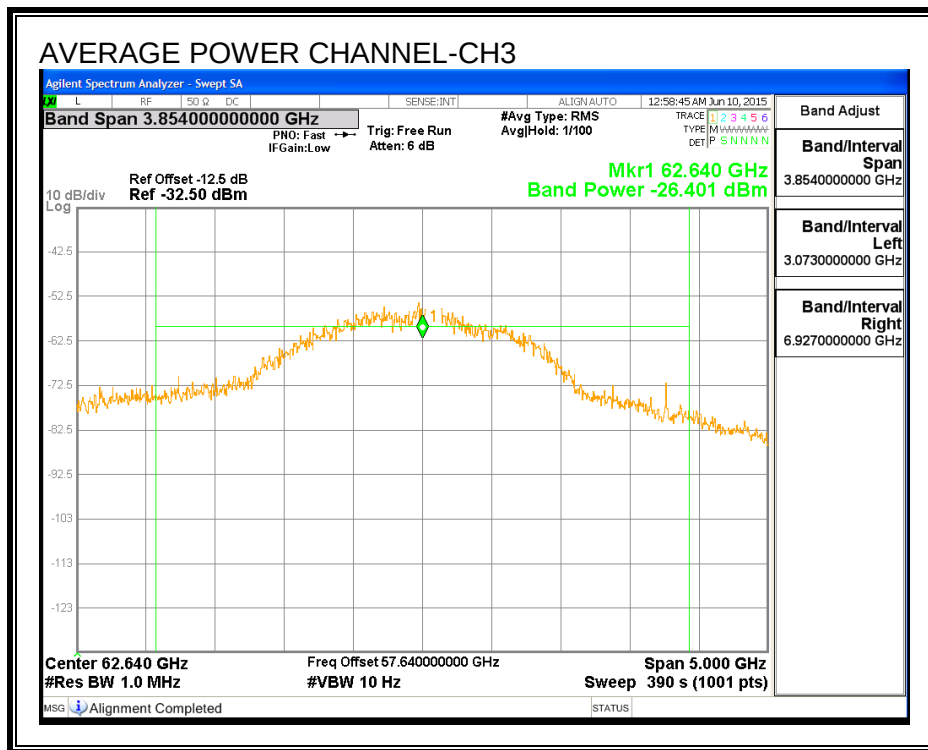
AVERAGE POWER DENSITY-CH2

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
60.48	3.00	-23.11	23.00	31.5
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (uW/cm ²)	Average Limit (uW/cm ²)
1.415	3.0	0.0125	1.25	9

AVERAGE POWER DENSITY-CH3

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
62.64	3.00	-26.40	23.00	28.5
EIRP (W)	Specification Distance (m)	Power Density (W/m ²)	Power Density (uW/cm ²)	Average Limit (uW/cm ²)
0.711	3.0	0.0063	0.63	9





7.2. PEAK OUTPUT POWER

LIMIT

LP0002, Section 3.13.1 (3) Limits on the total peak transmitter output power

- (3.1) For the transmitters with an emission bandwidth of larger than 100MHz, the total peak transmitter output power shall not exceed 500mW.
- (3.2) Transmitters with an emission bandwidth of not greater than 100MHz must limit their peak transmitter output power to the product of 500mW times their emission bandwidth divided by 100MHz.
- (3.3) For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6dB below the maximum radiated power spectral density in the band, as measured with a 100kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g. for frequency hopping devices).
- (3.4) Peak transmitter output power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57-64GHz band and that has a video bandwidth of at least 10MHz, or using an equivalent measurement method.
- (3.5) For radiated measurement, corrections to the transmitter output power may be made due to the antenna and circuit loss.

PROCEDURE

The maximum EUT antenna gain is subtracted from the Peak EIRP.

RESULTS

PEAK OUTPUT POWER

Frequency (GHz)	EIRP (dBm)	EUT Antenna Gain (dBi)	Output Power (dBm)	Output Power (mW)	6 dB Bandwidth (MHz)	Output Power Limit (mW)
58.32	35.10	14.00	21.10	128.8	1210.0	500
60.48	39.20	14.00	25.20	331.1	1495.0	500
62.64	36.10	14.00	22.10	162.2	1515.0	500

7.3. FREQUENCY STABILITY

LIMIT

LP0002, Section 3.13.1 (4) .This frequency tolerance shall be maintained for a temperature variation of 0 to +50°C at normal supply voltage, and for a variation in the primary supply voltage within $\pm 15\%$ of the rated supply voltage at a temperature of 20°C Fundamental emissions must be contained within 57 GHz-64 GHz during all conditions of operation.. For battery operated equipment, the equipment tests shall be performed using new battery

TEST PROCEDURE

The radio module is placed in an environmental chamber, with power furnished by an adjustable source. The carrier frequency is counted at each condition and compared with the reference condition.

RESULTS

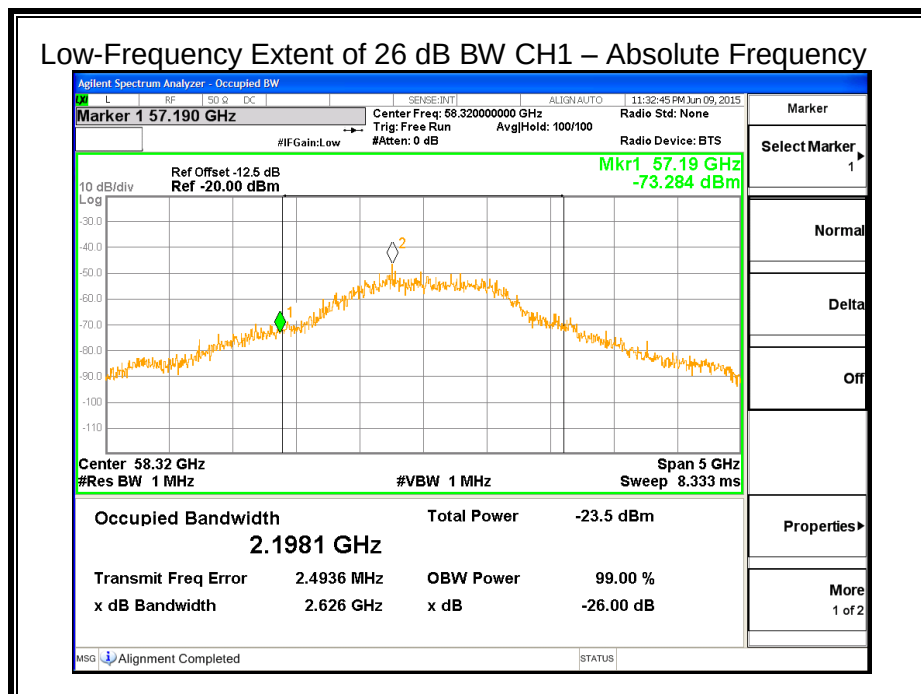
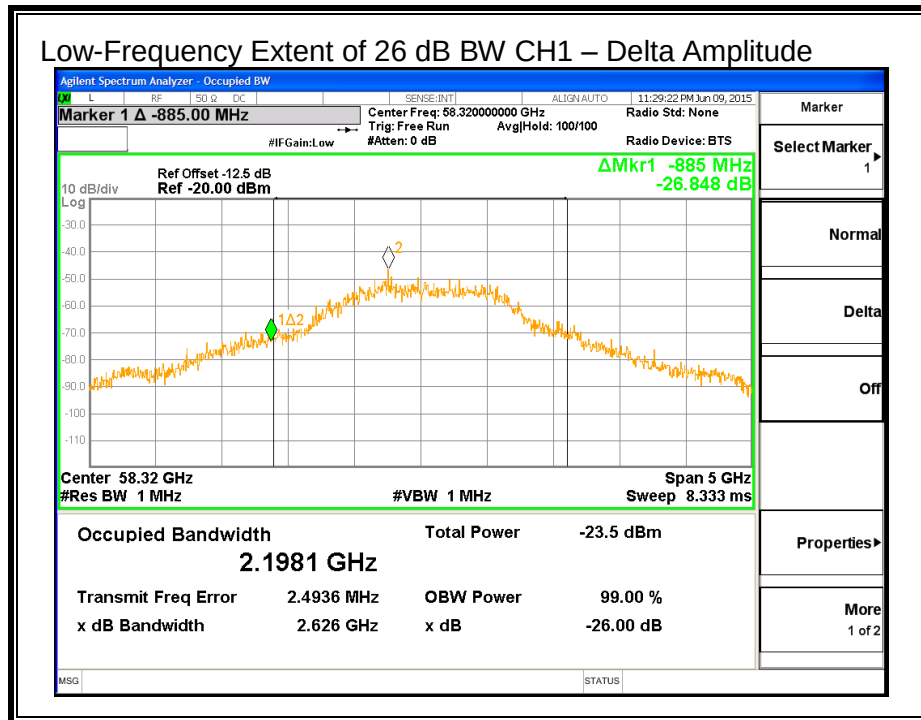
Operating Frequency: 60.48 GHz									
Temp (°C)	Pwr Supp. (VAC)	0 minutes		2 minutes		5 minutes		10 minutes	
		Meas. Freq. (MHz)	Freq. Drift (ppm)		Freq. Drift (ppm)	Meas. Freq. (MHz)	Freq. Drift (ppm)	Meas. Freq. (MHz)	Freq. Drift (ppm)
70	115	60580.93014	15	60580.94764	16	60580.97271	16	60580.99032	16
60	115	60580.43939	7	60580.43552	7	60580.43559	7	60580.43379	7
50	115	60580.16005	3	60580.16145	3	60580.16423	3	60580.16752	3
40	115	60580.07508	1	60580.07529	1	60580.07552	1	60580.07594	1
30	115	60580.09549	2	60580.09469	2	60580.09467	2	60580.094	2
20	115	60580.17849	3	60580.17828	3	60580.17807	3	60580.17813	3
10	115	60580.28174	5	60580.28515	5	60580.28699	5	60580.28791	5
0	115	60580.40185	7	60580.40378	7	60580.4049	7	60580.40825	7
-10	115	60580.49577	8	60580.49634	8	60580.49627	8	60580.49686	8
-20	115	60580.52544	9	60580.52525	9	60580.52465	9	60580.52446	9
-30	115	60580.43768	7	60580.43555	7	60580.43575	7	60580.43388	7
20	97.75	60580.179	3	60580.1787	3	60580.179	3	60580.17865	3
20	132.25	60580.202	3	60580.17701	3	60580.179	3	60580.179	3

Applicant's declared operating temperature range is -30 deg C to +70 deg C.
100 MHz CW Baseband Signal yields offset from channel center frequency.

Worst-case drift of 16 ppm = 969 kHz, round up to 1000 kHz for following calculations.

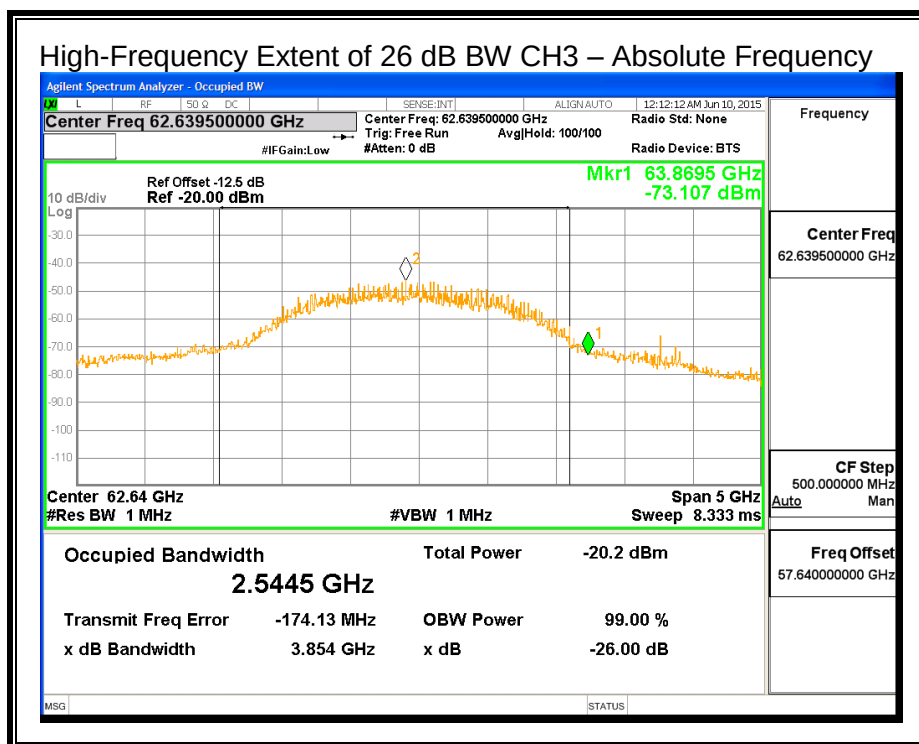
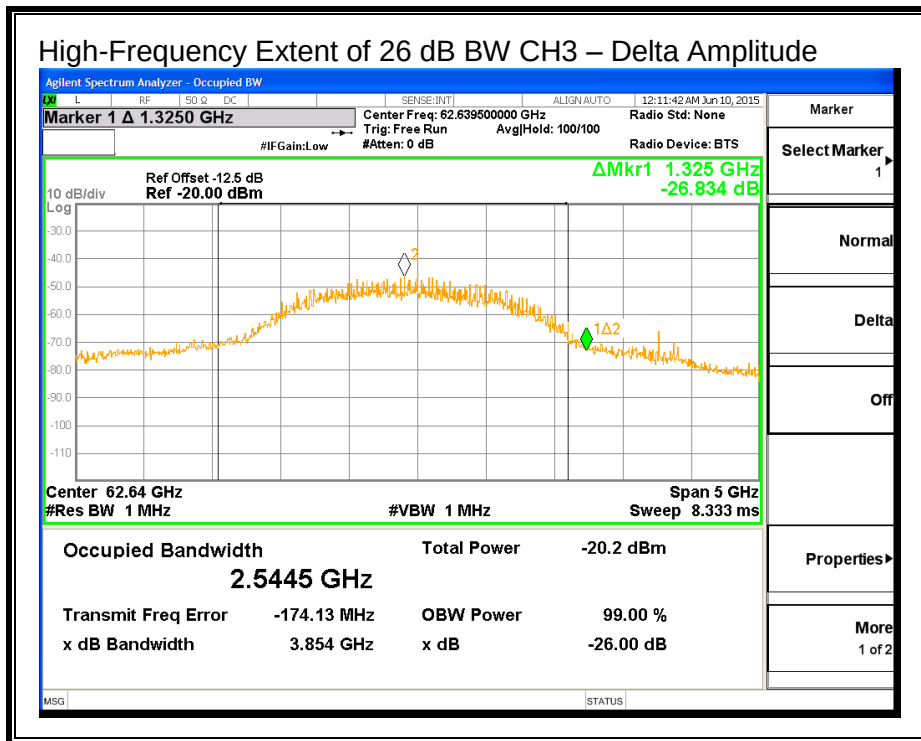
LOW-FREQUENCY EXTENT OF 26 dB BW COMPARED TO 57 GHz AUTHORIZED BAND EDGE

Extent of 26 dB BW (at normal temperature) 57.1900 GHz
Tolerance from Frequency Stability $\pm .0010$ GHz
Extent of 26 dB BW (over temperature extremes) 57.1890 GHz



HIGH-FREQUENCY EXTENT OF 26 dB BW COMPARED TO 64 GHz AUTHORIZED BAND EDGE

Extent of 26 dB BW (at normal temperature)	63.8695 GHz
Tolerance from Frequency Stability	± .0010 GHz
Extent of 26 dB BW (over temperature extremes)	63.8705 GHz



7.4. TX SPURIOUS EMISSIONS

LIMITS

LP0002, Section 3.13.1 (2) Limits on spurious emissions:

- (2.1) The power density of any emissions outside the 57-64GHz band shall consist solely of spurious emissions.
- (2.2) Radiated emissions below 40GHz shall not exceed the general limits in Section 2.8 of this part.
- (2.3) Between 40GHz and 200GHz, the level of these emissions shall not exceed 90pW/cm² at a distance of 3 meters.
- (2.4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

PROCEDURE FOR 30 MHz TO 40 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables.

PROCEDURE FOR 40 TO 200 GHz

External mixers are utilized.

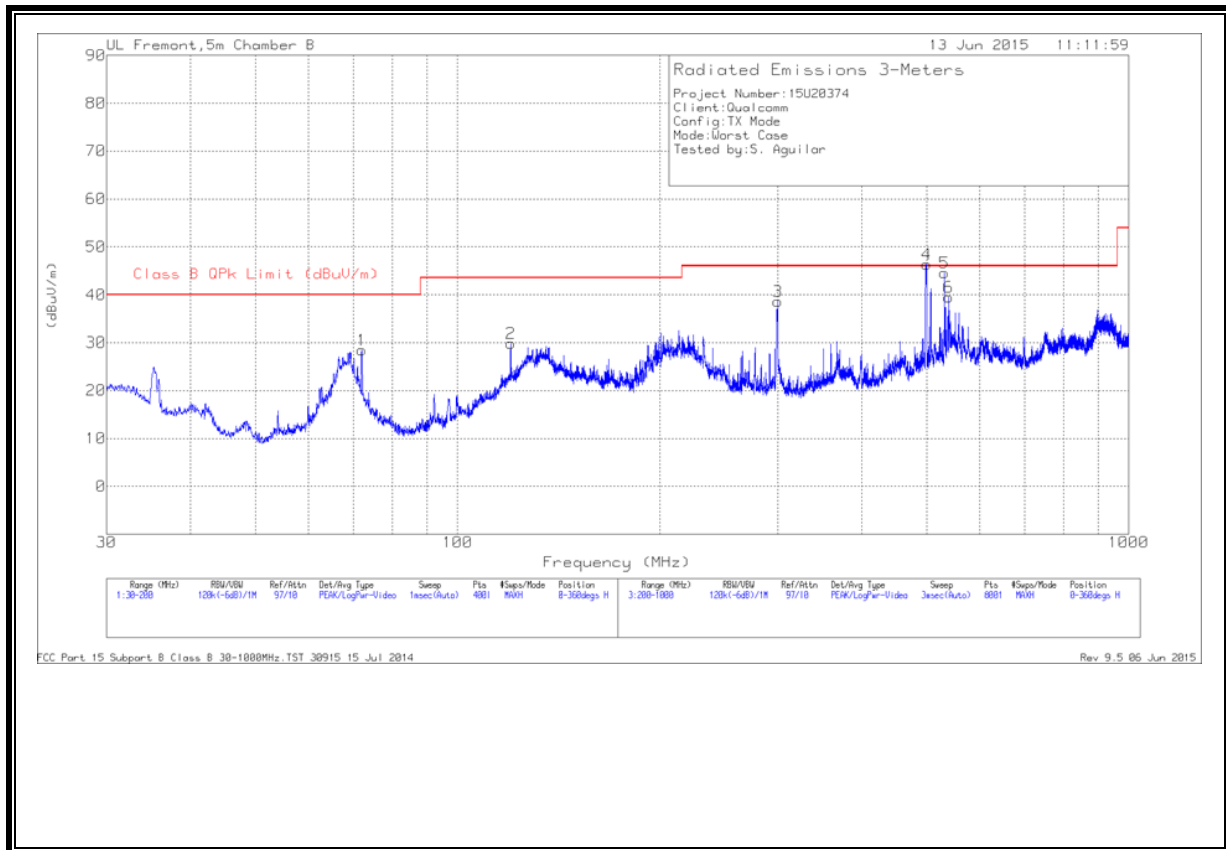
The antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations, at a maximum distance of 5 cm from the EUT.

A final test is made at any frequencies at which emissions are found. During this final scan, the antenna is kept no further from the EUT than the maximum distance calculated for each mixer band that yields a minimum system noise floor at least 6 dB below the spurious emissions limit.

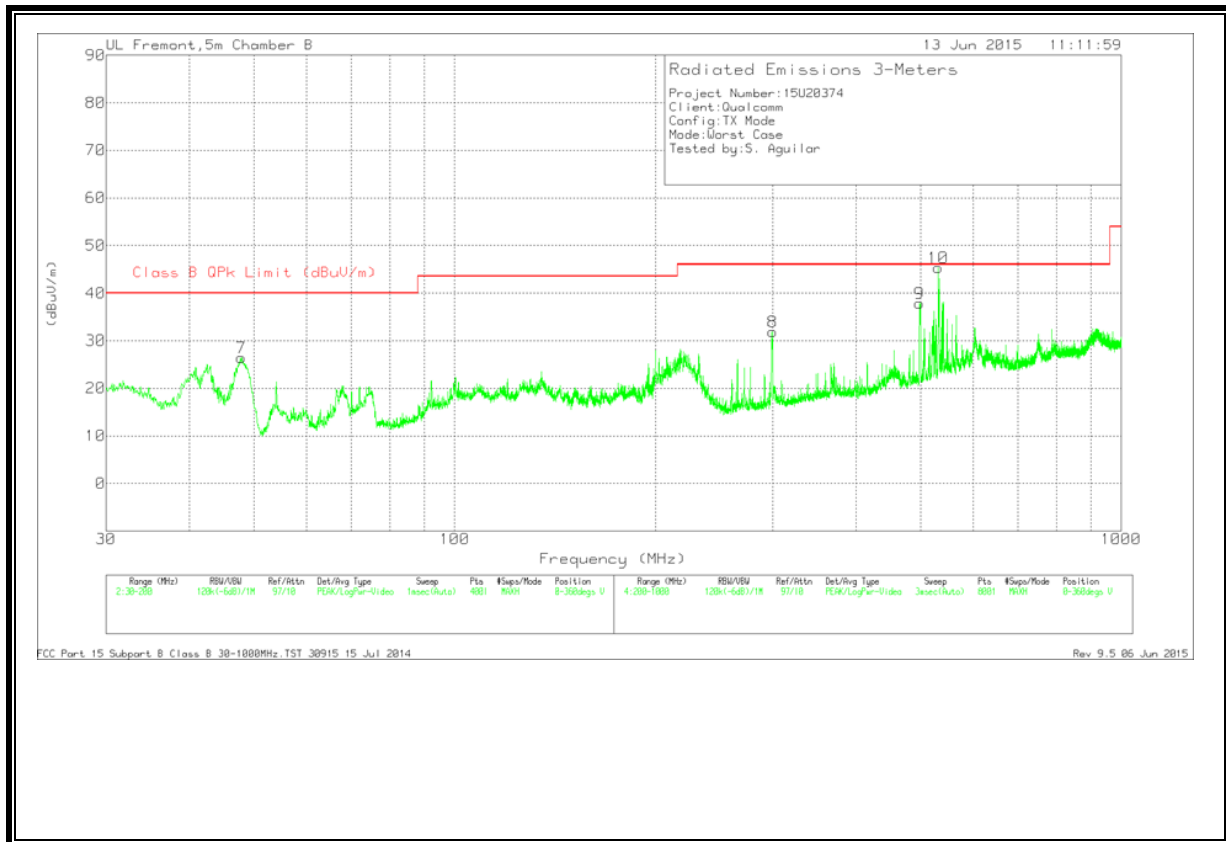
The power is measured, the EIRP is calculated, then the extrapolated power density at a 3 meter distance is calculated.

7.4.2. Spurious Emissions 30 MHz TO 1 GHz

TX SPURIOUS EMISSION 30 TO 1000 MHz (HORIZONTAL PLOT)



TX SPURIOUS EMISSION 30 TO 1000 MHz (VERTICAL PLOT)



TX SPURIOUS EMISSION 30 MHz-1 GHz

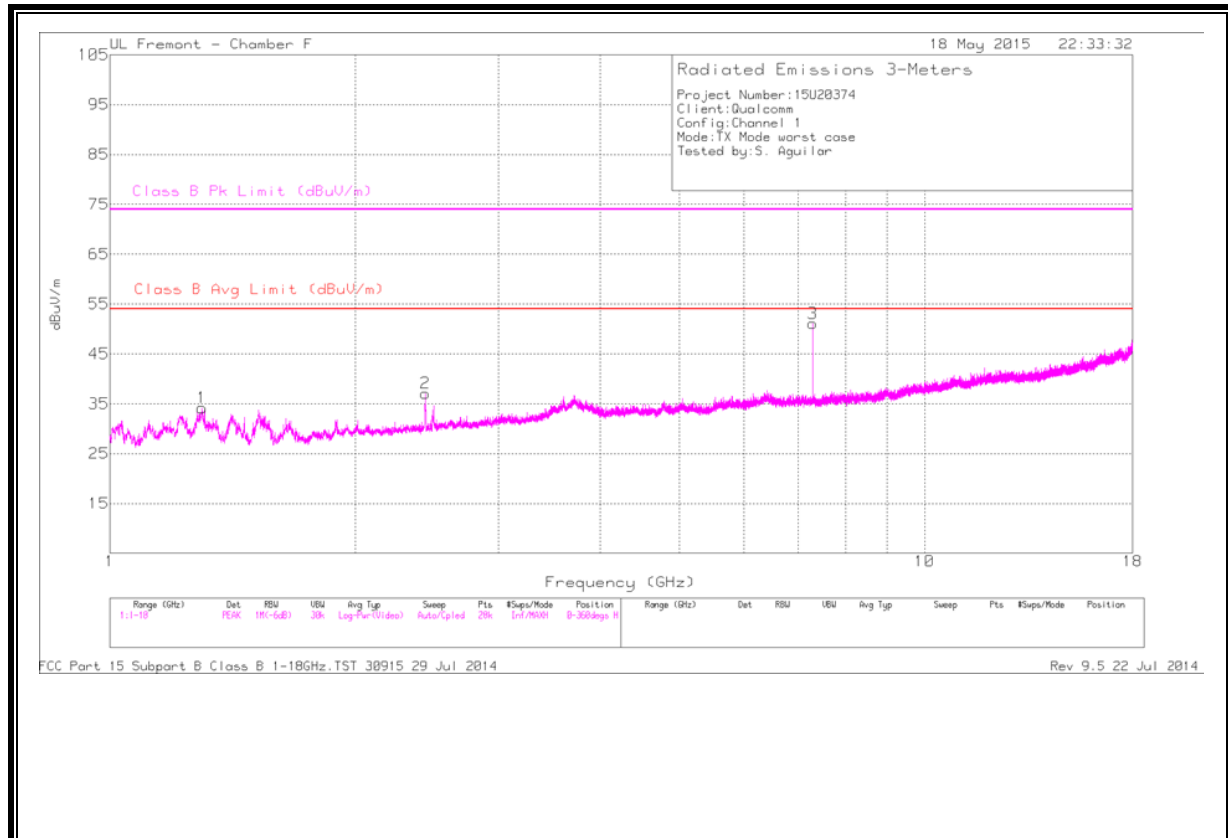
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	47.8925	45.89	Pk	9	-28.5	26.39	40	-13.61	0-360	100	V
1	71.99	48.71	Pk	8.1	-28.3	28.51	40	-11.49	0-360	199	H
2	120.015	43.53	Pk	14.1	-27.8	29.83	43.52	-13.69	0-360	199	H
3	299.79	51.21	Pk	13.4	-25.9	38.71	46.02	-7.31	245	104	H
3	299.797	49.1	Qp	13.4	-25.9	36.6	46.02	-9.42	245	104	H
8	299.8	44.38	Pk	13.4	-25.9	31.88	46.02	-14.14	0-360	199	V
9	497.852	43.82	Pk	17.8	-25.6	36.02	46.02	-10	224	223	V
9	497.798	41.45	Qp	17.8	-25.6	33.65	46.02	-12.37	224	223	V
4	499.681	53.6	Pk	17.8	-25.7	45.7	46.02	-.32	93	208	H
4	499.694	51.22	Qp	17.8	-25.7	43.32	46.02	-2.7	93	208	H
5	531.2	60.96	Pk	18.1	-25.5	53.56	46.02	7.54	109	210	H
5	531.2	39.32	Qp	18.1	-25.5	31.92	46.02	-14.1	109	210	H
10	530.997	55.98	Pk	18	-25.5	48.48	46.02	2.46	256	230	V
10	531.001	35.02	Qp	18.1	-25.5	27.62	46.02	-18.4	256	230	V
6	539.384	27.78	Qp	18.3	-25.5	20.58	46.02	-25.44	295	311	H
6	539.389	47.59	Pk	18.3	-25.5	40.39	46.02	-5.63	295	311	H

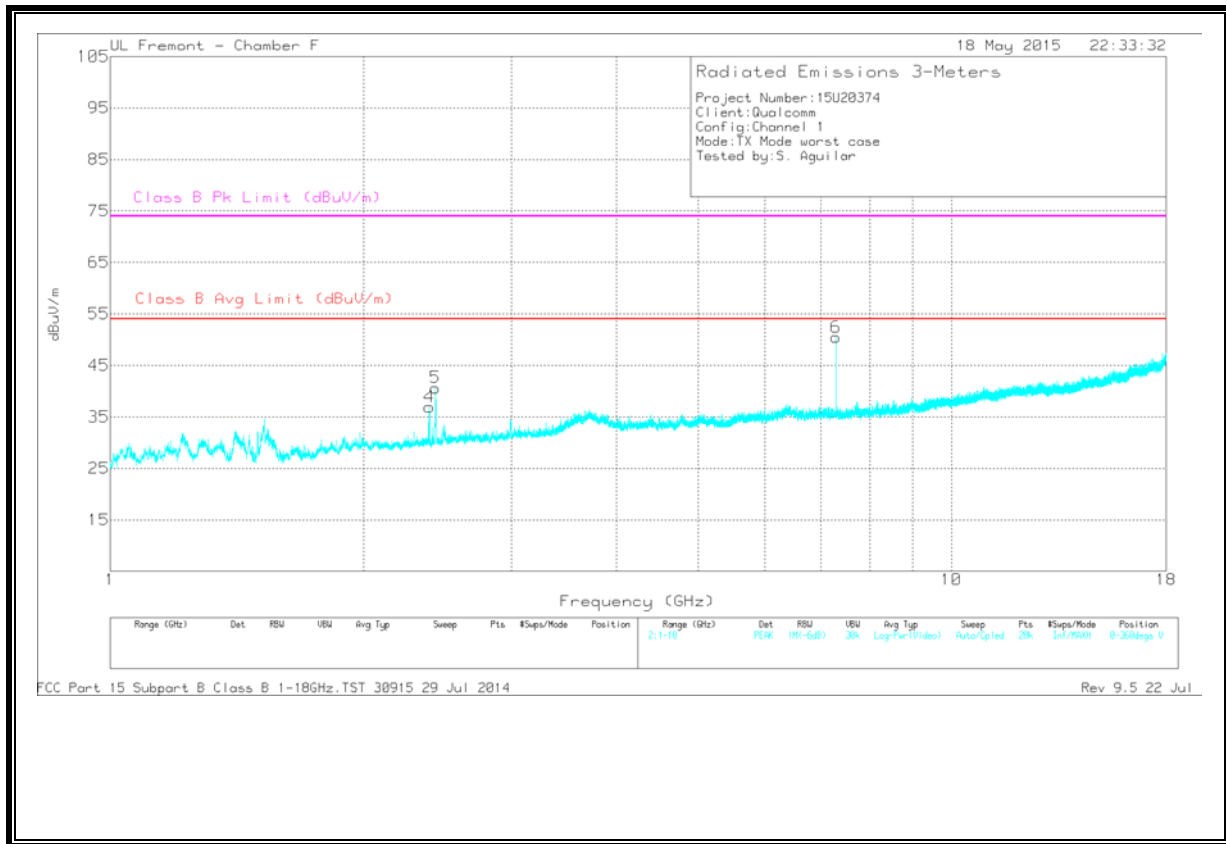
PK - Peak detector , QP - Quasi-Peak detector

7.4.3. Spurious Emissions 1 TO 18 GHz

CHANNEL 1 - TX SPURIOUS EMISSION 1-18 GHz (HORIZONTAL PLOT)



CHANNEL 1 – TX SPURIOUS EMISSION 1-18 GHz (VERTICAL PLOT)



CHANNEL 1 TX SPURIOUS EMISSION 1-18 GHz

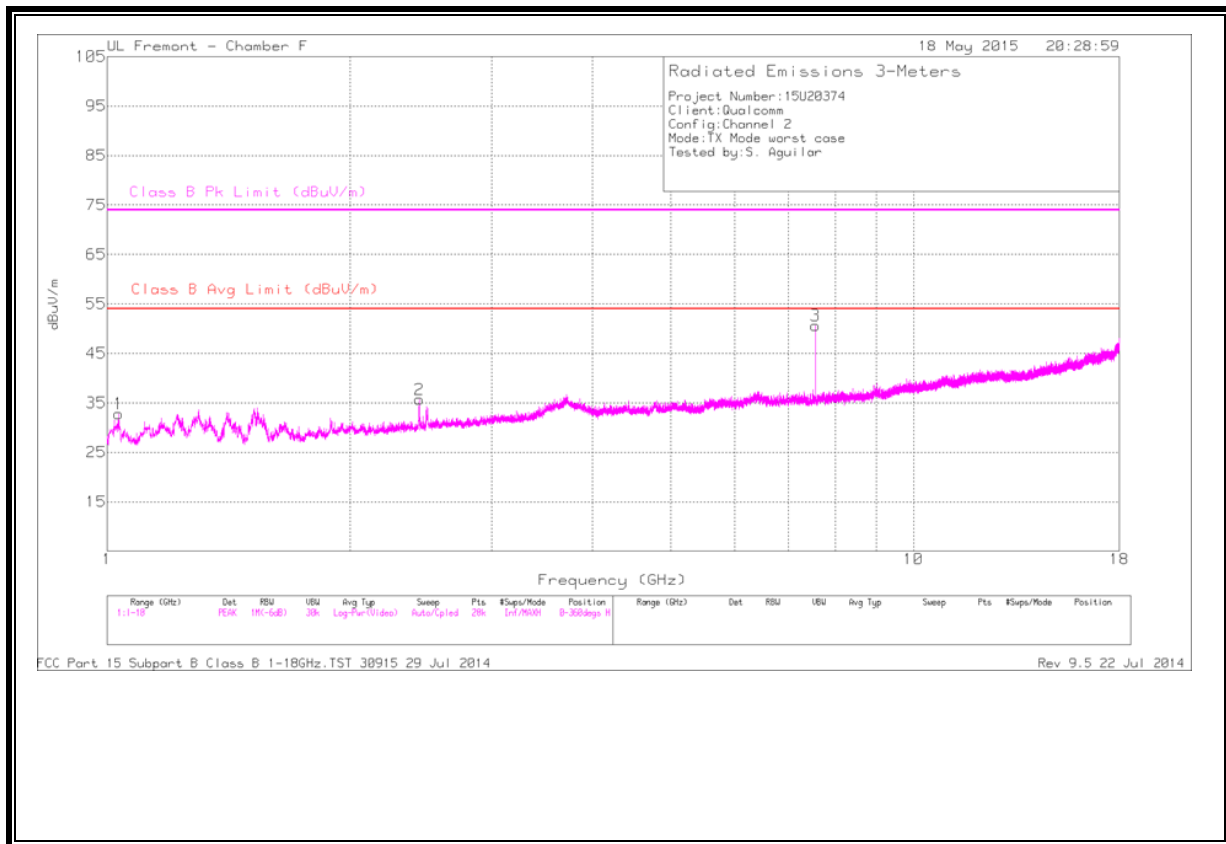
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR) Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.298	36.18	PK	30	-32	34.18	-	-	74	-39.82	0-360	101	H
2	2.439	36	PK	32	-30.9	37.1	-	-	74	-36.9	0-360	201	H
3	7.29	45.32	PK	35.7	-26.8	54.22	-	-	74	-19.78	22	276	H
3	7.29	42.59	Avg	35.7	-26.8	51.49	54	-2.51	-	-	22	276	H
4	2.396	35.81	PK	31.9	-30.8	36.91	-	-	74	-37.09	0-360	201	V
5	2.435	39.65	PK	32	-31	40.65	-	-	74	-33.35	0-360	201	V
6	7.29	44.97	PK	35.7	-26.8	53.87	-	-	74	-20.13	30	171	V
6	7.29	42.21	Avg	35.7	-26.8	51.11	54	-2.89	-	-	30	171	V

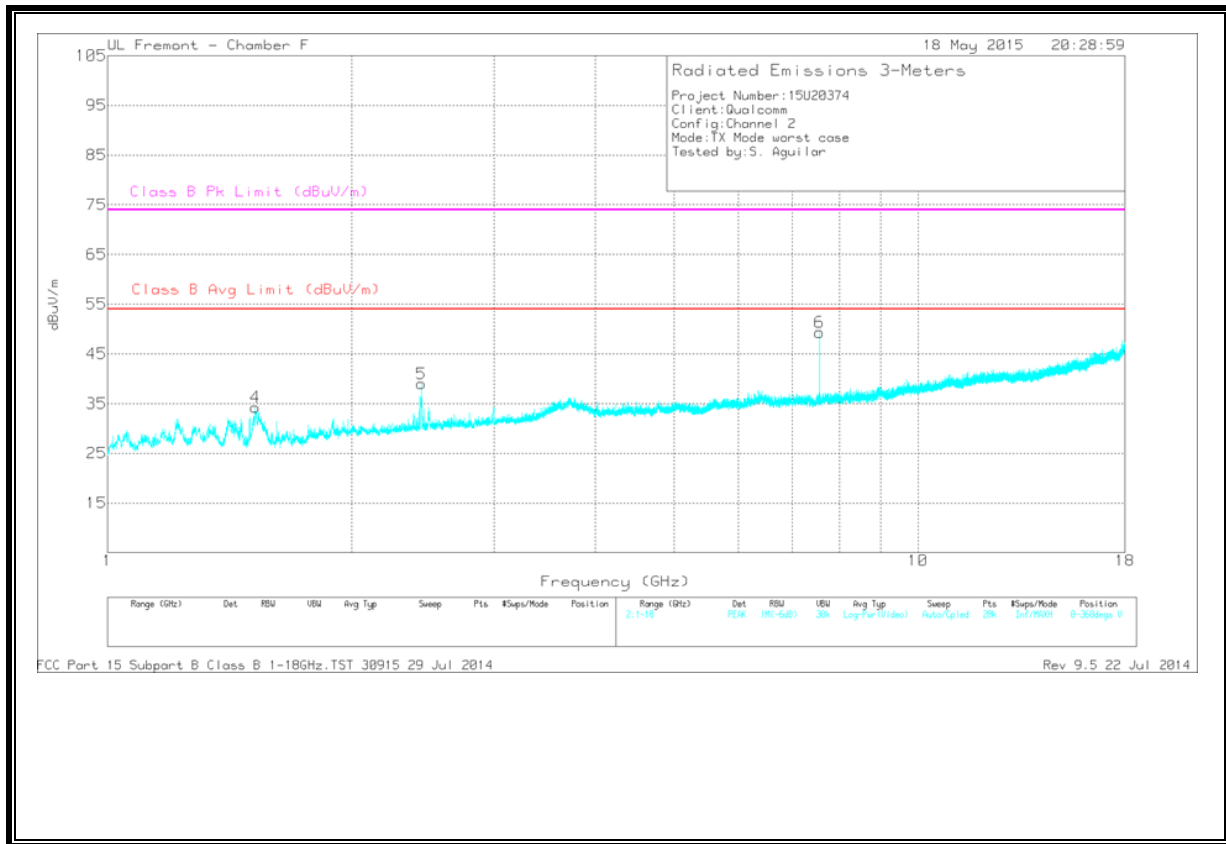
PK - Peak detector

Avg - Video bandwidth < Resolution bandwidth

CHANNEL 2 - TX SPURIOUS EMISSION 1-18 GHz (HORIZONTAL PLOT)



CHANNEL 2 – TX SPURIOUS EMISSION 1-18 GHz (VERTICAL PLOT)



CHANNEL 2 TX SPURIOUS EMISSION 1-18 GHz

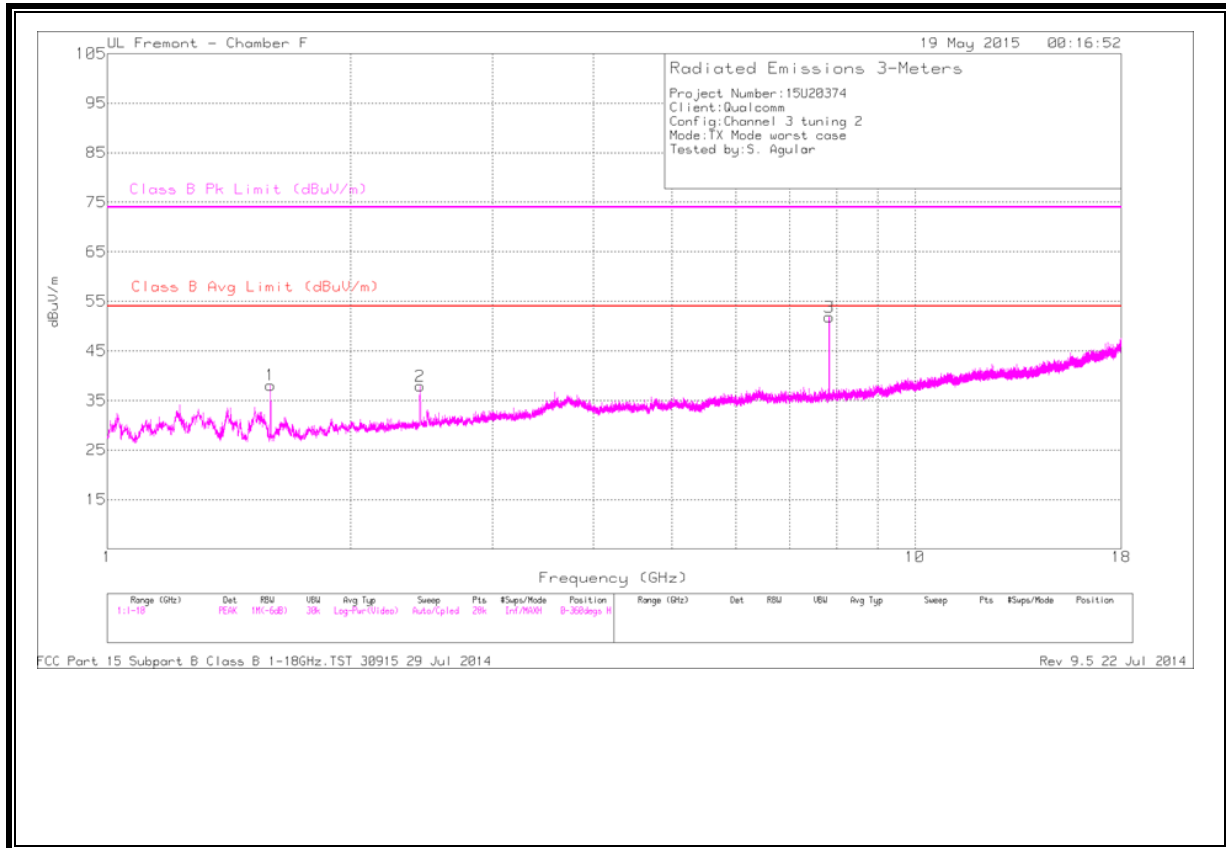
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR) Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.034	38	PK	27.3	-32.5	32.8	-	-	74	-41.2	0-360	100	H
2	2.438	34.6	PK	32	-30.9	35.7	-	-	74	-38.3	0-360	100	H
3	7.56	45.49	PK	35.8	-26.2	55.09	-	-	74	-18.91	353	110	H
3	7.56	42.22	Avg	35.8	-26.2	51.82	54	-2.81	-	-	353	110	H
4	1.521	37.87	PK	28.2	-31.8	34.27	-	-	74	-39.73	0-360	201	V
5	2.439	37.9	PK	32	-30.9	39	-	-	74	-35	0-360	101	V
6	7.56	46.08	PK	35.8	-26.2	55.68	-	-	74	-18.32	338	212	V
6	7.56	42.77	Avg	35.8	-26.2	52.37	54	-1.63	-	-	338	212	V

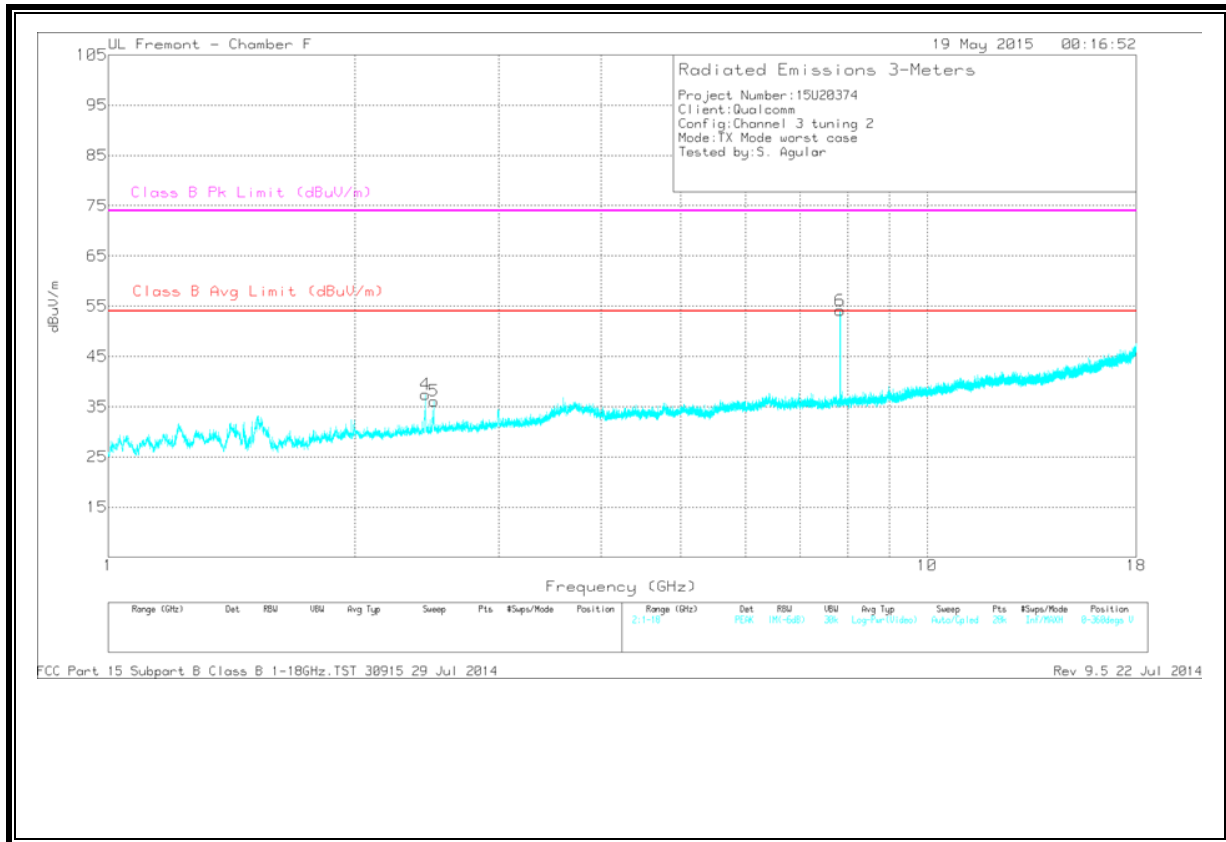
PK - Peak detector

Avg - Video bandwidth < Resolution bandwidth

CHANNEL 3 - TX SPURIOUS EMISSION 1-18 GHz (HORIZONTAL PLOT)



CHANNEL 3 – TX SPURIOUS EMISSION 1-18 GHz (VERTICAL PLOT)



CHANNEL 3 TX SPURIOUS EMISSION 1-18 GHz

Trace Markers

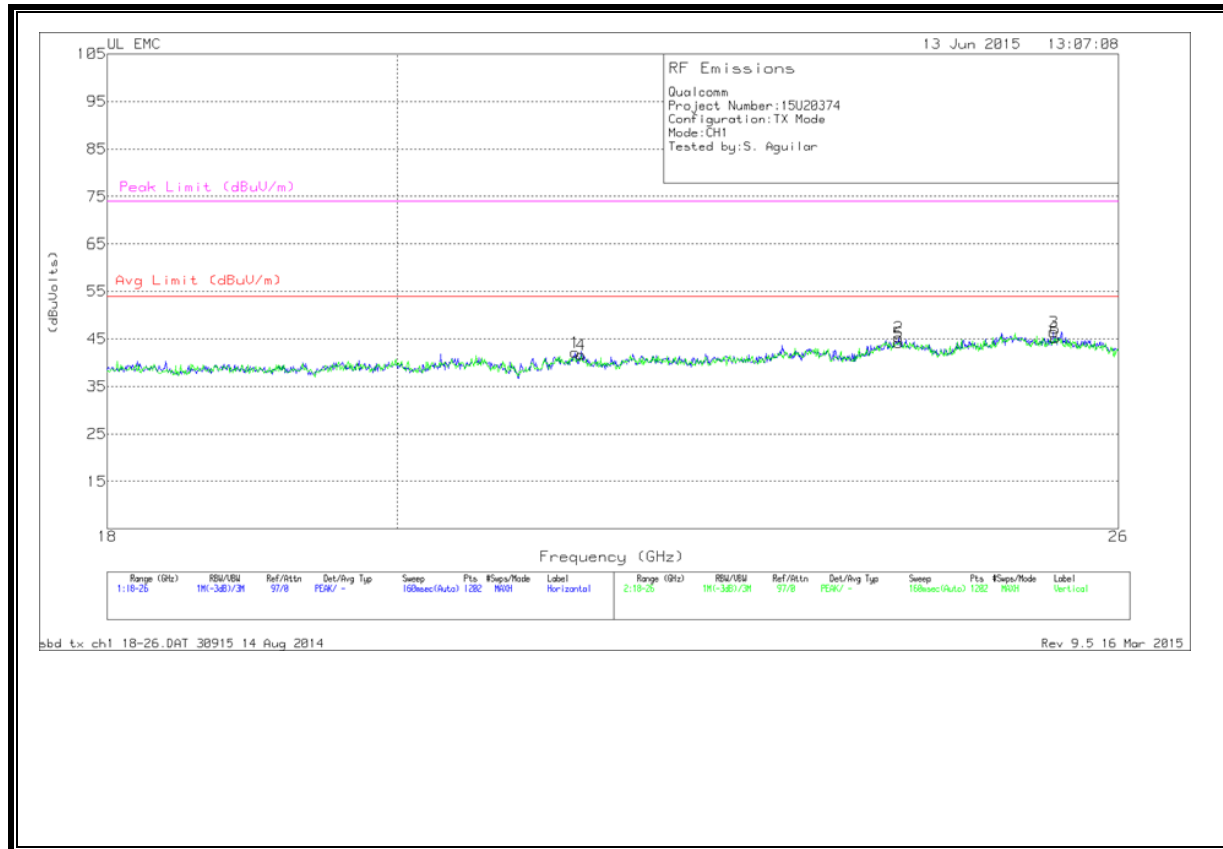
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR) Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.593	41.68	PK	28.1	-31.7	38.08	-	-	74	-35.92	0-360	201	H
2	2.439	36.8	PK	32	-30.9	37.9	-	-	74	-36.1	0-360	201	H
3	7.83	44.09	PK	35.7	-26.1	53.69	-	-	74	-20.31	58	134	H
3	7.83	40.7	Avg	35.7	-26.1	50.3	54	-3.7	-	-	58	134	H
4	2.439	36.35	PK	32	-30.9	37.45	-	-	74	-36.55	0-360	101	V
5	2.499	34.43	PK	32.3	-30.6	36.13	-	-	74	-37.87	0-360	201	V
6	7.83	45.38	PK	35.7	-26.1	54.98	-	-	74	-19.02	64	149	V
6	7.83	43.07	Avg	35.7	-26.1	52.67	54	-1.33	-	-	64	149	V

PK - Peak detector

Avg - Video bandwidth < Resolution bandwidth

7.4.4. Spurious Emissions 18 to 26 GHz

CHANNEL 1 - TX SPURIOUS EMISSION 18 TO 26 GHz (HORIZONTAL AND VERTICAL PLOT)



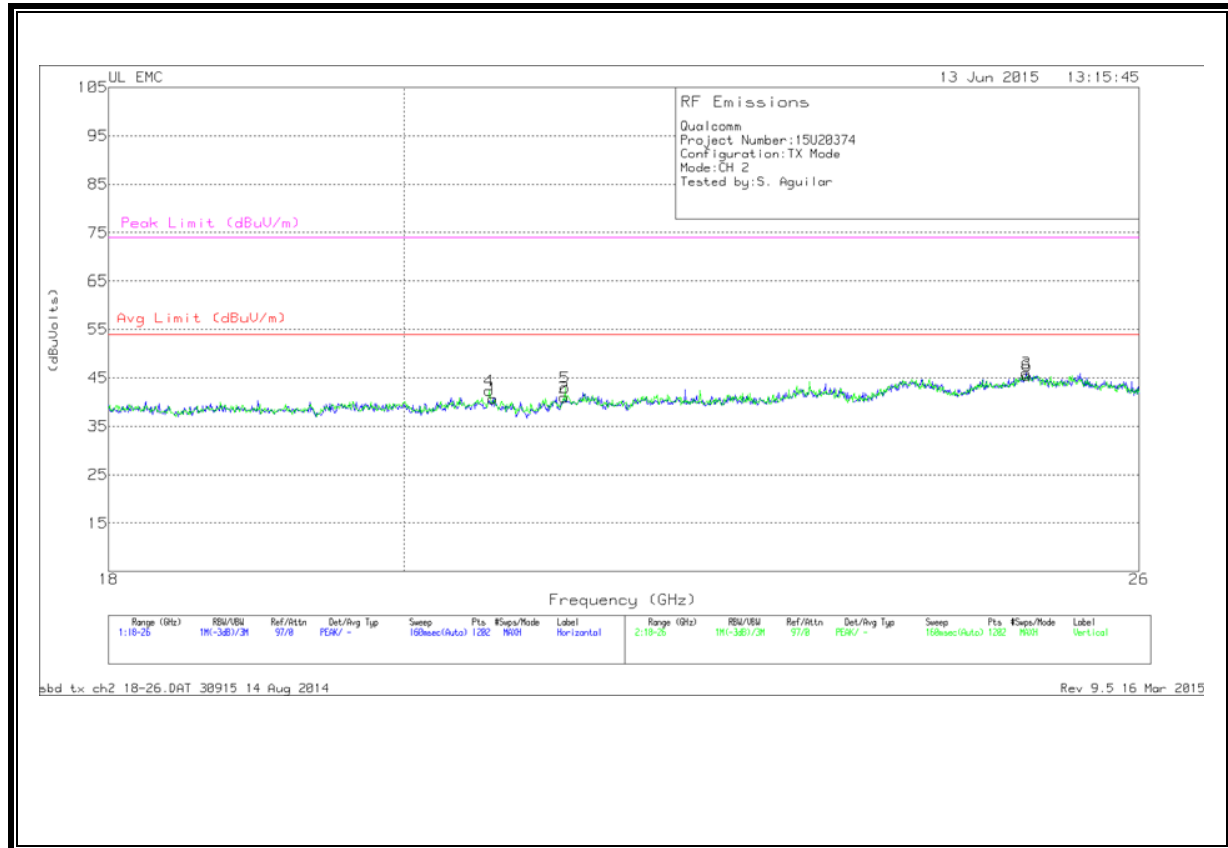
CHANNEL 1 -TX SPURIOUS EMISSION 18 TO 26 GHz

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	21.337	42.57	Pk	33.1	-24	-9.5	42.16	54	-11.83	74	-31.83
2	24.002	44.33	Pk	33.2	-22.7	-9.5	45.333	54	-8.66	74	-28.66
3	25.394	45.3	Pk	33.7	-23	-9.5	46.5	54	-7.5	74	-27.5
4	21.384	41.77	Pk	33.1	-23.7	-9.5	41.66	54	-12.33	74	-32.33
5	24.002	43.17	Pk	33.2	-22.7	-9.5	44.16	54	-9.83	74	-29.83
6	25.407	43.67	Pk	33.8	-22.8	-9.5	45.16	54	-8.83	74	-28.83

Pk - Peak detector

CHANNEL 2 - TX SPURIOUS EMISSION 18 TO 26 GHz (HORIZONTAL AND VERTICAL PLOT)



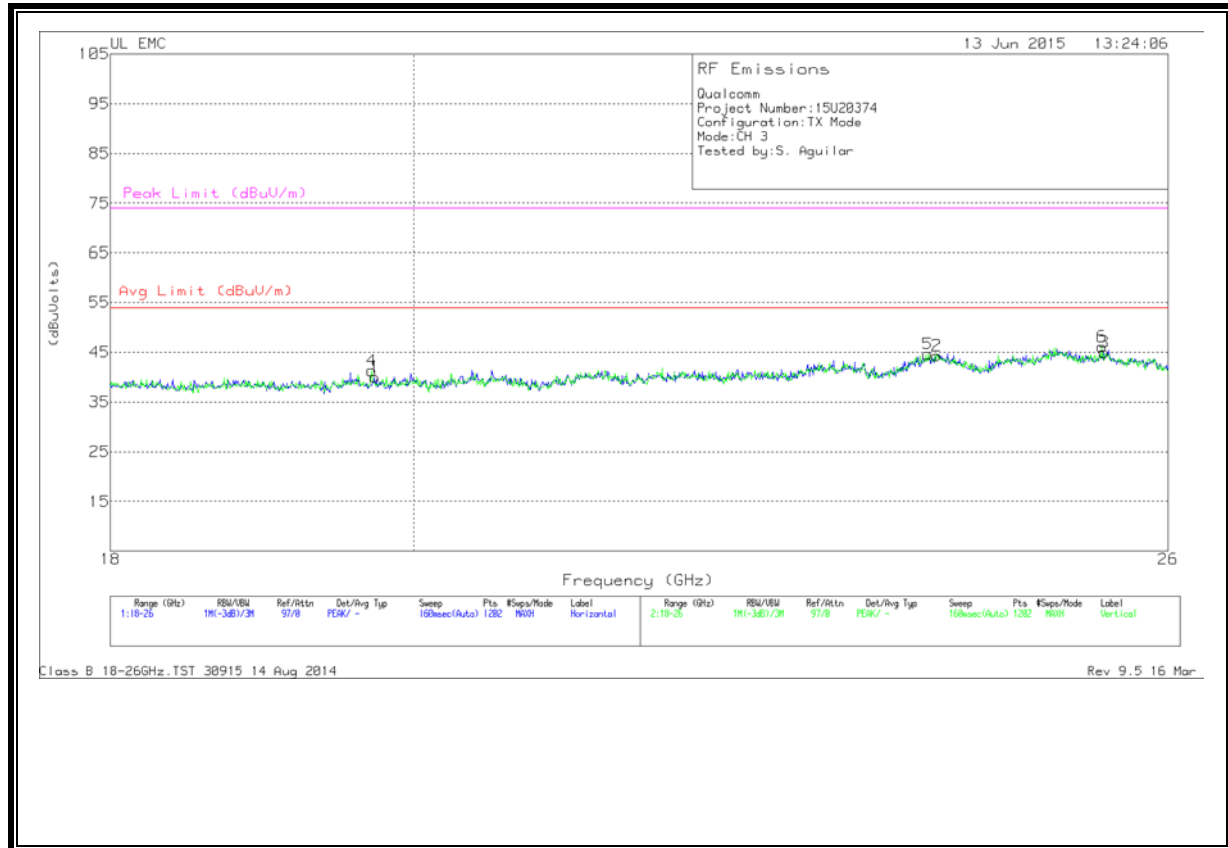
CHANNEL 2 -TX SPURIOUS EMISSION 18 TO 26 GHz

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	20.644	40.77	Pk	32.7	-23.3	-9.5	40.66	54	-13.33	74	-33.33
2	21.177	41	Pk	33	-23.5	-9.5	41	54	-13	74	-33
3	24.974	44.3	Pk	34.1	-22.9	-9.5	46	54	-8	74	-28
4	20.618	42.73	Pk	32.7	-23.6	-9.5	42.33	54	-11.66	74	-31.66
5	21.184	43	Pk	33	-23.5	-9.5	43	54	-11	74	-31
6	24.981	43.7	Pk	34.2	-22.9	-9.5	45.5	54	-8.5	74	-28.5

Pk - Peak detector

CHANNEL 3 - TX SPURIOUS EMISSION 18 TO 26 GHz (HORIZONTAL AND VERTICAL PLOT)



CHANNEL 3 -TX SPURIOUS EMISSION 18 TO 26 GHz

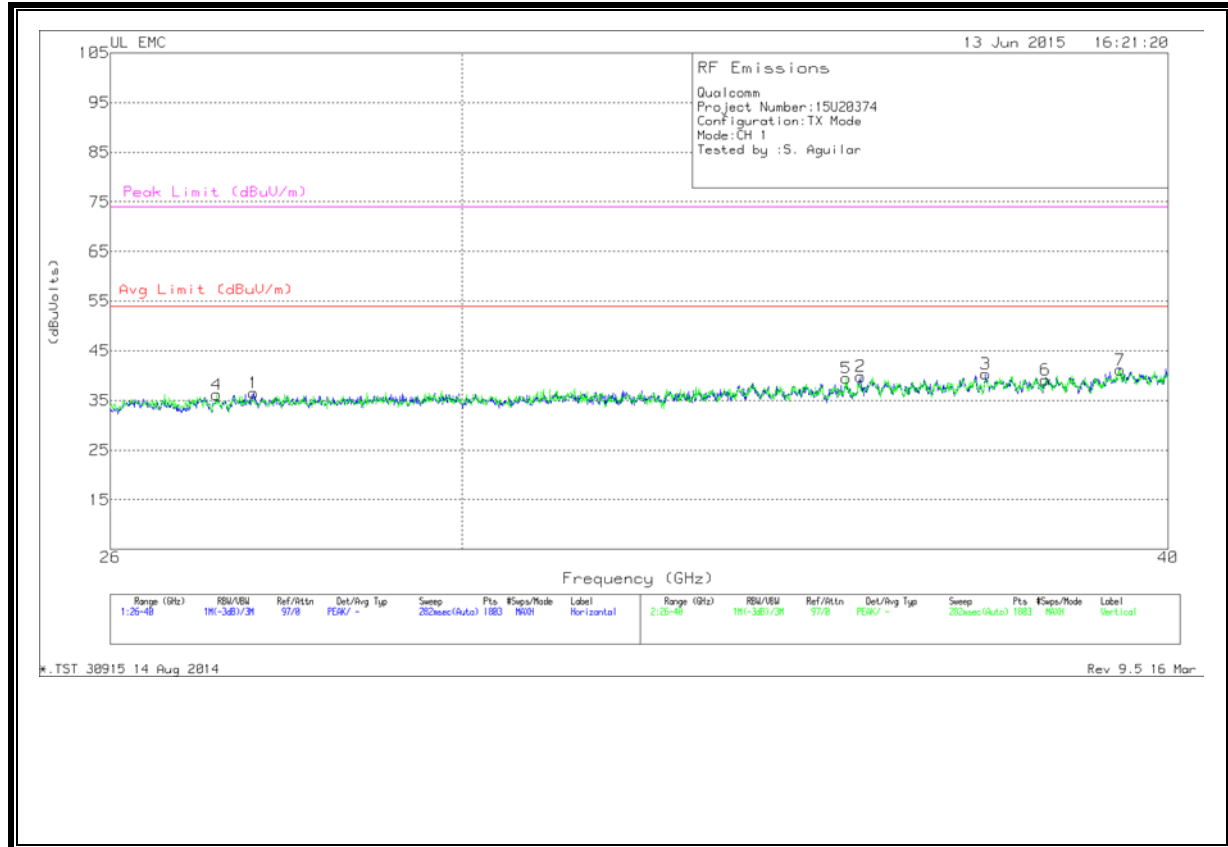
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.732	40.9	Pk	32.5	-23.9	-9.5	40	54	-14	74	-34
2	23.988	43.23	Pk	33.3	-22.7	-9.5	44.33	54	-9.66	74	-29.66
3	25.427	43.8	Pk	33.8	-23.1	-9.5	45	54	-9	74	-29
4	19.712	42.33	Pk	32.5	-24	-9.5	41.33	54	-12.66	74	-32.66
5	23.915	43.47	Pk	33.4	-22.7	-9.5	44.66	54	-9.33	74	-29.33
6	25.407	44.67	Pk	33.8	-22.8	-9.5	46.16	54	-7.83	74	-27.83

Pk - Peak detector

7.4.5. Spurious Emissions 26 TO 40 GHz

CHANNEL 1 - TX SPURIOUS EMISSION 26 TO 40 GHz (HORIZONTAL AND VERTICAL PLOT)



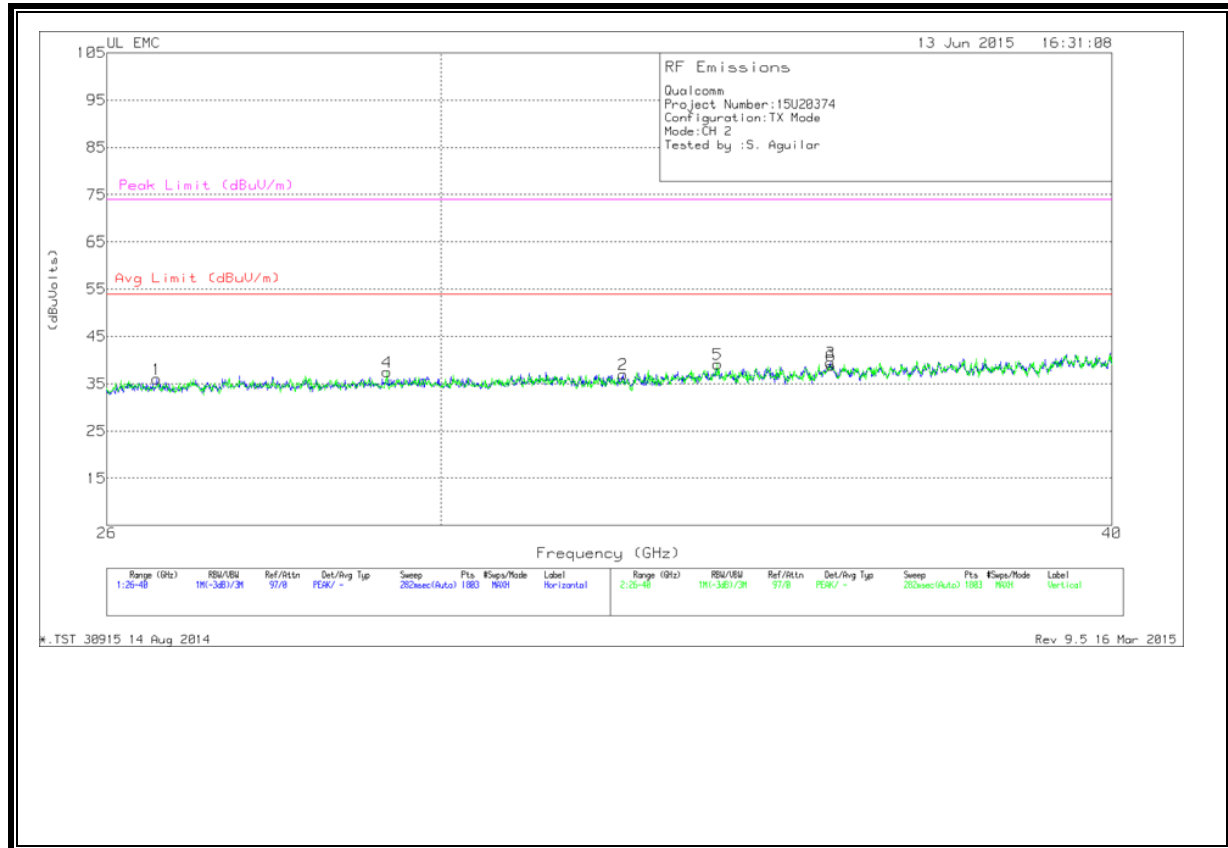
CHANNEL 1 -TX SPURIOUS EMISSION 26 TO 40 GHz

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBUV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBUV/m)	Avg Limit (dBUV/m)	Margin (dB)	Peak Limit (dBUV/m)	PK Margin (dB)
1	27.562	44.7	Pk	35.7	-34.4	-9.5	36.5	54	-17.5	74	-37.5
2	35.292	48.53	Pk	37.7	-36.9	-9.5	39.83	54	-14.16	74	-34.16
3	37.133	50.03	Pk	37.2	-37.4	-9.5	40.33	54	-13.66	74	-33.66
4	27.15	43.97	Pk	35.5	-33.8	-9.5	36.16	54	-17.83	74	-37.83
5	35.082	48.5	Pk	37.4	-36.9	-9.5	39.5	54	-14.5	74	-34.5
6	38.05	49.07	Pk	37.2	-37.6	-9.5	39.16	54	-14.83	74	-34.83
7	39.223	48.17	Pk	38.5	-36	-9.5	41.16	54	-12.83	74	-32.83

Pk - Peak detector

CHANNEL 2 - TX SPURIOUS EMISSION 26 TO 40 GHz (HORIZONTAL AND VERTICAL PLOT)



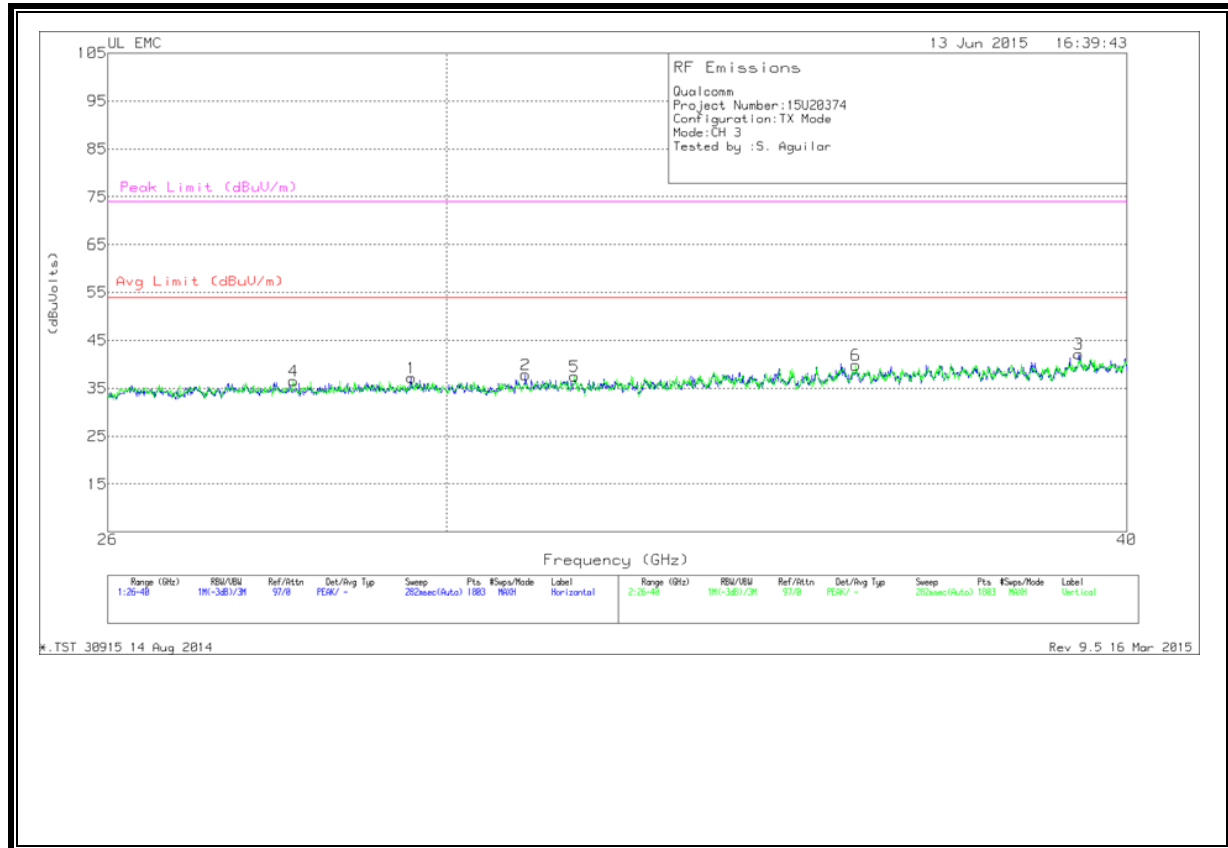
CHANNEL 2 -TX SPURIOUS EMISSION 26 TO 40 GHz

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	26.559	43.3	Pk	35.4	-33.2	-9.5	36	54	-18	74	-38
2	32.441	46.3	Pk	36.2	-36	-9.5	37	54	-17	74	-37
3	35.455	48.5	Pk	37.9	-37.4	-9.5	39.5	54	-14.5	74	-34.5
4	29.317	46.1	Pk	35.9	-35	-9.5	37.5	54	-16.5	74	-36.5
5	33.777	48.37	Pk	36.8	-36.5	-9.5	39.16	54	-14.83	74	-34.83
6	35.463	47.83	Pk	37.9	-37.4	-9.5	38.83	54	-15.16	74	-35.16

Pk - Peak detector

CHANNEL 3 - TX SPURIOUS EMISSION 26 TO 40 GHz (HORIZONTAL AND VERTICAL PLOT)



CHANNEL 3 -TX SPURIOUS EMISSION 26 TO 40 GHz

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	29.558	46.07	Pk	35.9	-35.3	-9.5	37.16	54	-16.83	74	-36.83
2	31.019	47.03	Pk	35.9	-35.6	-9.5	37.83	54	-16.16	74	-36.16
3	39.192	49.27	Pk	38.3	-35.9	-9.5	42.16	54	-11.83	74	-31.83
4	28.121	45.1	Pk	35.8	-34.9	-9.5	36.5	54	-17.5	74	-37.5
5	31.671	46.8	Pk	36.3	-36.1	-9.5	37.5	54	-16.5	74	-36.5
6	35.665	49.33	Pk	37.4	-37.4	-9.5	39.83	54	-14.16	74	-34.16

Pk - Peak detector

7.4.6. Spurious Emissions 40 TO 200 GHz

No other emissions up to 200 GHz detected above the noise floor.

7.5. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

LP0002, Section 2.3

2.3 For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.

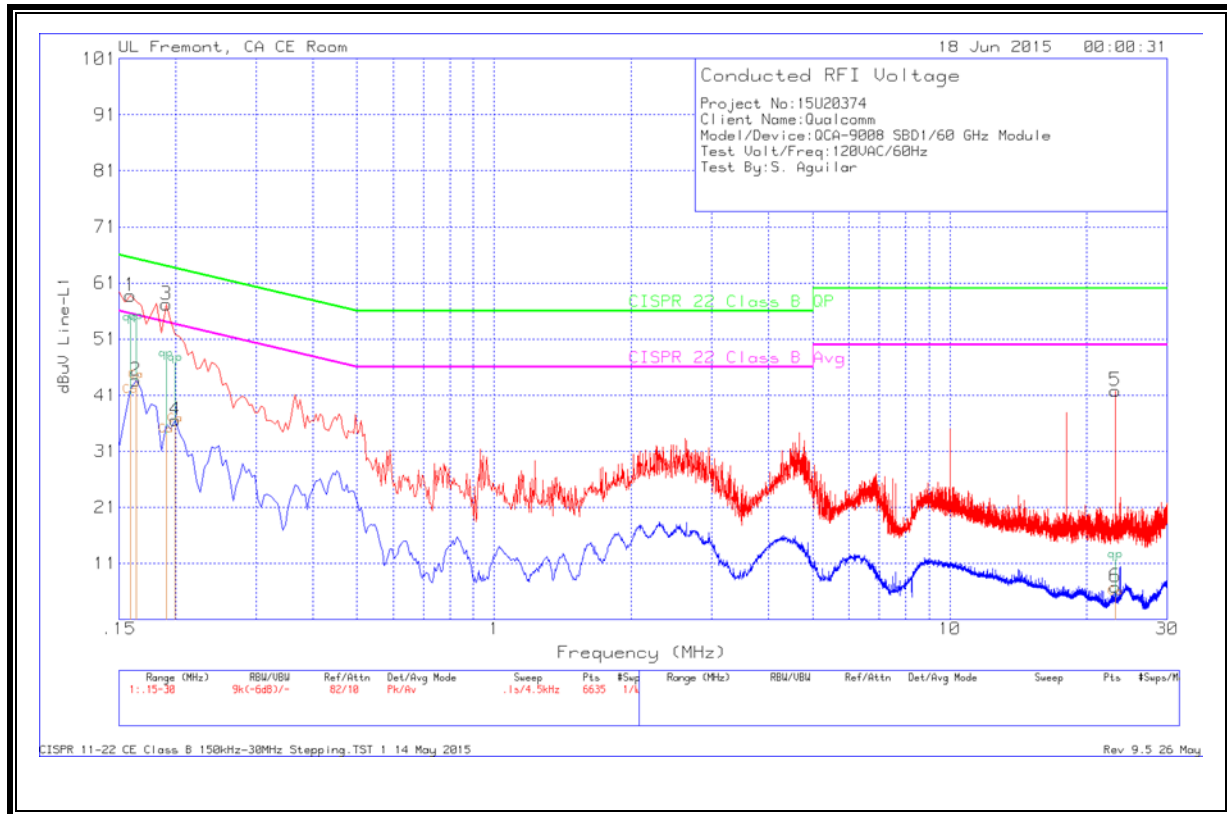
Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 – 56 _(Note)	56 – 46 _(Note)
0.5-5	56	46
5-30	60	50

TEST PROCEDURE

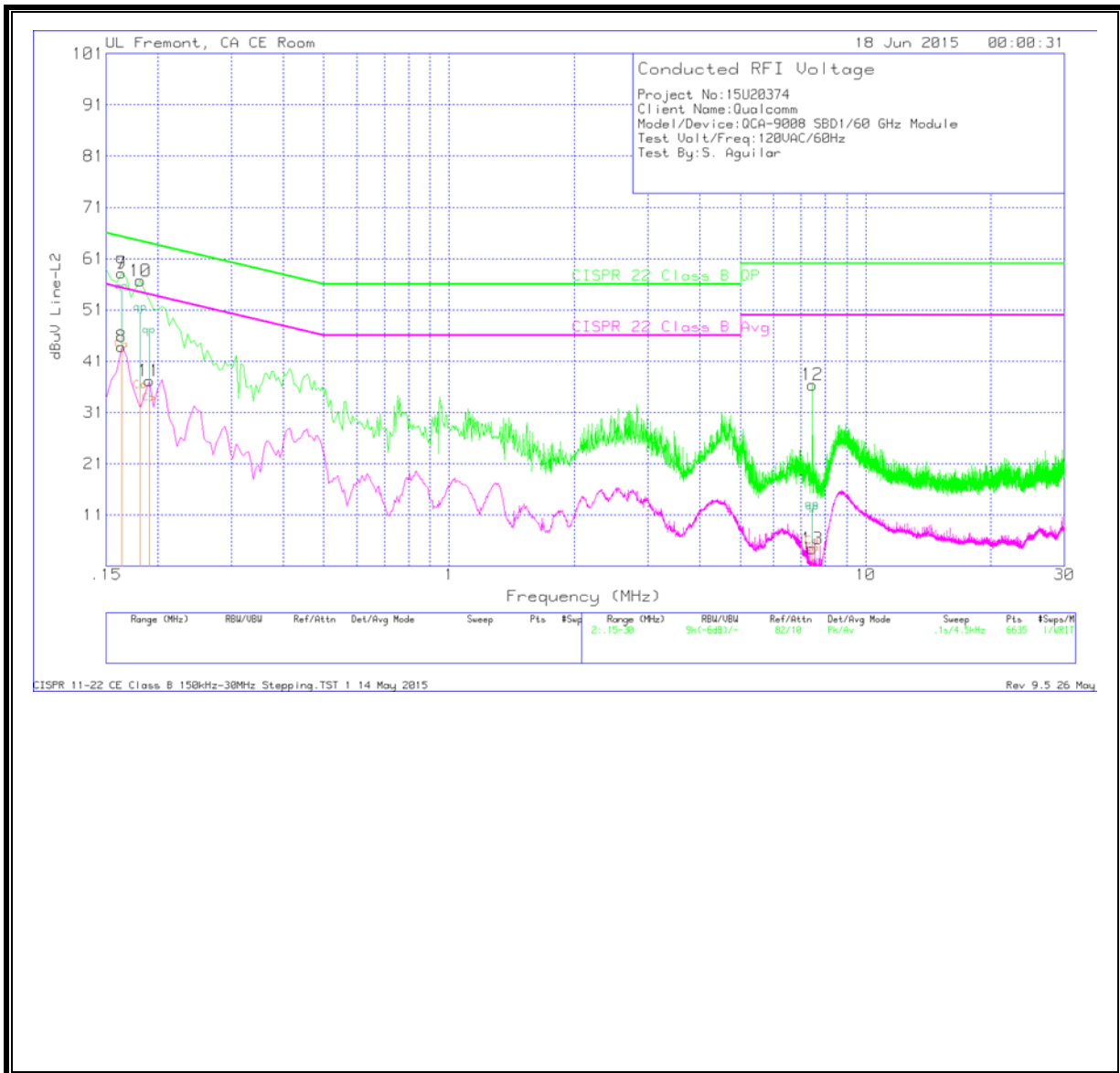
ANSI C63.10

RESULTS

6 WORST EMISSIONS



LINE 2 RESULTS



LINE 1 and 2 RESULTS

Trace Markers

Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.159	52.52	Qp	1.3	0	53.82	65.52	-11.7	-	-
1	.159	39.62	Ca	1.3	0	40.92	-	-	55.52	-14.6
2	.1635	52.87	Qp	1.2	0	54.07	65.28	-11.21	-	-
2	.1635	42.41	Av	1.2	0	43.61	-	-	55.28	-11.67
2	.1635	42.34	Ca	1.2	0	43.54	-	-	55.28	-11.74
3	.1905	46.38	Qp	1	0	47.38	64.01	-16.63	-	-
3	.1905	32.9	Ca	1	0	33.9	-	-	54.01	-20.11
4	.1995	45.78	Qp	.9	0	46.68	63.63	-16.95	-	-
4	.1995	35.66	Av	.9	0	36.56	-	-	53.63	-17.07
4	.1995	34.88	Ca	.9	0	35.78	-	-	53.63	-17.85
5	23.1135	11.03	Qp	.3	.2	11.53	60	-48.47	-	-
6	23.1135	6.34	Av	.3	.2	6.84	-	-	50	-43.16
6	23.1135	4.43	Ca	.3	.2	4.93	-	-	50	-45.07

Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
7	.1635	53.32	Qp	1.3	0	54.62	65.28	-10.66	-	-
7	.1635	41.94	Ca	1.3	0	43.24	-	-	55.28	-12.04
8	.1635	42.55	Av	1.3	0	43.85	-	-	55.28	-11.43
10	.1815	49.29	Qp	1.2	0	50.49	64.42	-13.93	-	-
10	.1815	34.08	Ca	1.2	0	35.28	-	-	54.42	-19.14
11	.1905	44.92	Qp	1.1	0	46.02	64.01	-17.99	-	-
11	.1905	36.08	Av	1.1	0	37.18	-	-	54.01	-16.83
11	.1905	31.7	Ca	1.1	0	32.8	-	-	54.01	-21.21
12	7.449	11.28	Qp	.2	.1	11.58	60	-48.42	-	-
12	7.449	3.18	Ca	.2	.1	3.48	-	-	50	-46.52
13	7.4445	11.81	Qp	.2	.1	12.11	60	-47.89	-	-
13	7.4445	4.12	Av	.2	.1	4.42	-	-	50	-45.58
13	7.4445	4.65	Ca	.2	.1	4.95	-	-	50	-45.05

Pk - Peak detector, Av - Average detection, Peak/Average/RMS Emissions, Ca - CISPR average detection, Quasi-Peak Emissions

8. GROUP INSTALLATION

LIMIT

§15.255 (h) Any transmitter that has received the necessary FCC equipment authorization under the rules of this chapter may be mounted in a group installation for simultaneous operation with one or more other transmitter(s) that have received the necessary FCC equipment authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

RESULTS

The frequency, amplitude and phase of the transmit signal are set within the EUT. There are no external phase-locking inputs or any other means of combining two or more units together to realize a beam-forming array.

9. TRANSMITTER IDENTIFICATION

LIMIT

§15.255 (i) For all transmissions that emanate from inside of a building, within any one second interval of signal transmission, each transmitter with a peak output power equal to or greater than 0.1 mW or a peak power density equal to or greater than 3 nW/cm², as measured 3 meters from the radiating structure, must transmit a transmitter identification at least once. Each application for equipment authorization for equipment that will be used inside of a building must declare that the equipment contains the required transmitter identification feature and must specify a method whereby interested parties can obtain sufficient information, at no cost, to enable them to fully detect and decode this transmitter identification information. Upon the completion of decoding, the transmitter identification data block must provide the following fields:

- (1) FCC Identifier, which shall be programmed at the factory.
- (2) Manufacturer's serial number, which shall be programmed at the factory.
- (3) Provision for at least 24 bytes of data relevant to the specific device, which shall be field programmable. The grantee must implement a method that makes it possible for users to specify and update this data. The recommended content of this field is information to assist in contacting the operator.

RESULTS

Not Applicable.

The EUT is part of a WLAN. All components of the WLAN are for indoor operation only. There are no outdoor units therefore no transmissions are directed outside the building.

10. RF EXPOSURE

LP0002, Section 5.20.2

5.16.1 For purposes of RF exposure assessment requirements, Maximum Permissible Exposure (MPE) shall be measured, if separation distance of at least 20 centimeters is normally maintained between radiating structures and the body of the user or nearby persons. Limits are as follows:

(1) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-3.0	614	1.63	*100	6
3-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500	-----	-----	f/300	6
1,500-100,000	-----	-----	5.0	6

Note 1: asterisk (*) is plane-wave equivalent power density.

Note 2: f is the testing frequency in MHz.

(2) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-3.0	614	1.63	*100	30
3-30	1842/f	4.89/f	*180/f ²	30
30-300	27.5	0.073	1.0	30
300-1,500	-----	-----	f/1500	30
1,500-100,000	-----	-----	1.0	30

Note 1: asterisk (*) is plane-wave equivalent power density.

Note 2: f is the testing frequency in MHz.

CALCULATIONS

EIRP is converted to Power Density using the equation:

$$P_D = \text{EIRP} / (4 * \pi * D_S^2)$$

where:

D_S is the separation distance

RESULTS

Channel 1

Average EIRP (dBm)	Average EIRP (W)	Separation Distance (cm)	Power Density (W/m^2)	Power Density (mW/cm^2)	LP0002 Limit (mW/cm^2)
26.8	0.479	20	0.95	0.095	1

Channel 2

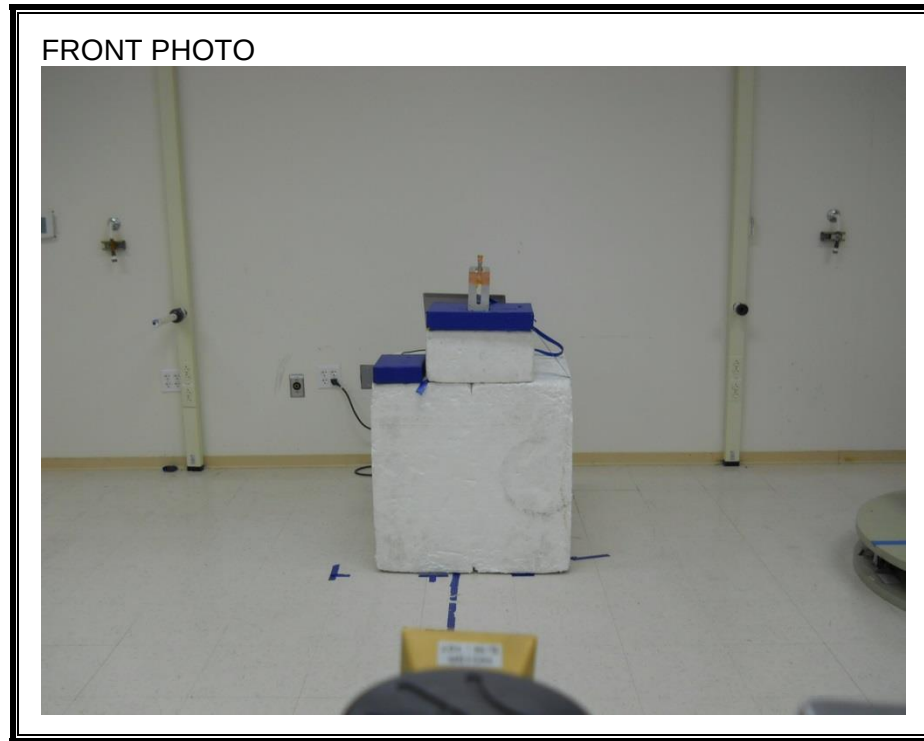
Average EIRP (dBm)	Average EIRP (W)	Separation Distance (cm)	Power Density (W/m^2)	Power Density (mW/cm^2)	LP0002 Limit (mW/cm^2)
31.5	1.413	20	2.81	0.281	1

Channel 3

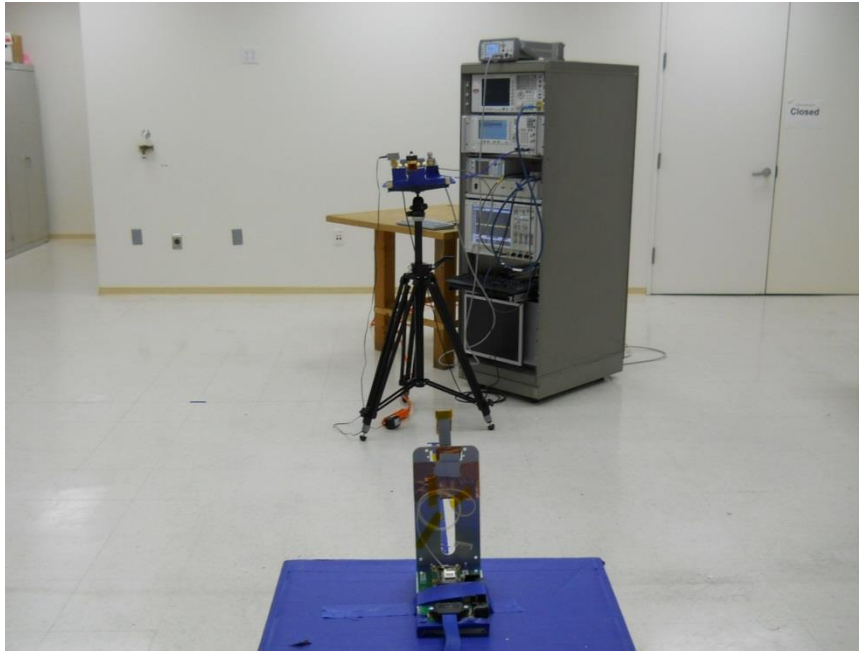
Average EIRP (dBm)	Average EIRP (W)	Separation Distance (cm)	Power Density (W/m^2)	Power Density (mW/cm^2)	LP0002 Limit (mW/cm^2)
28.5	0.708	20	1.41	0.141	1

11. SETUP PHOTOS

POWER DENSITY MEASUREMENT SETUP

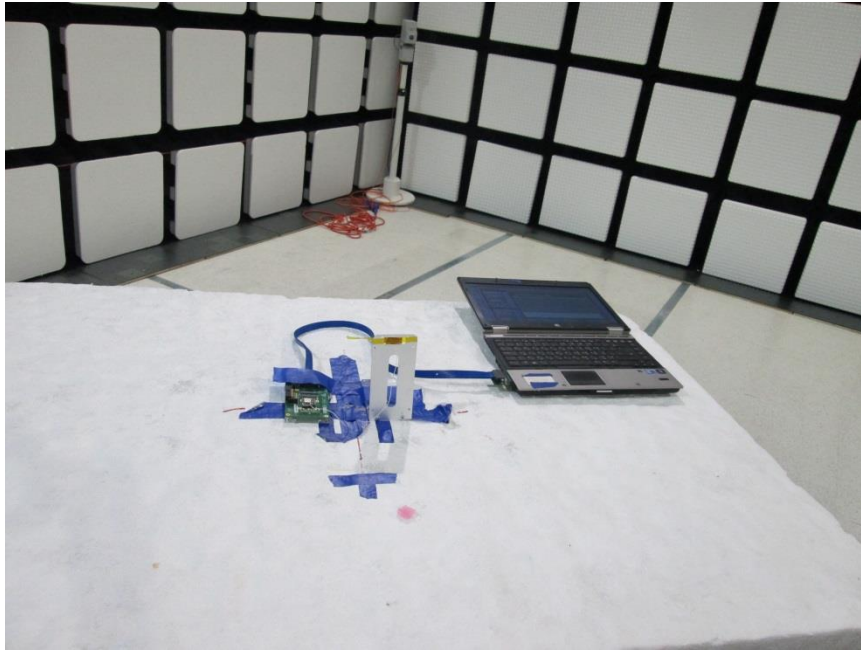


BACK PHOTO

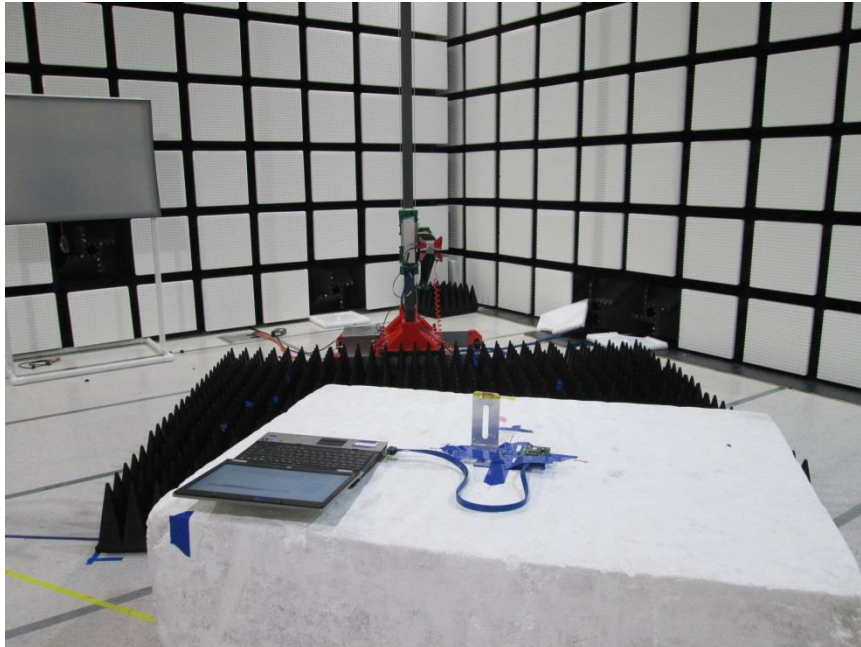


RADIATED RF MEASUREMENT SETUP

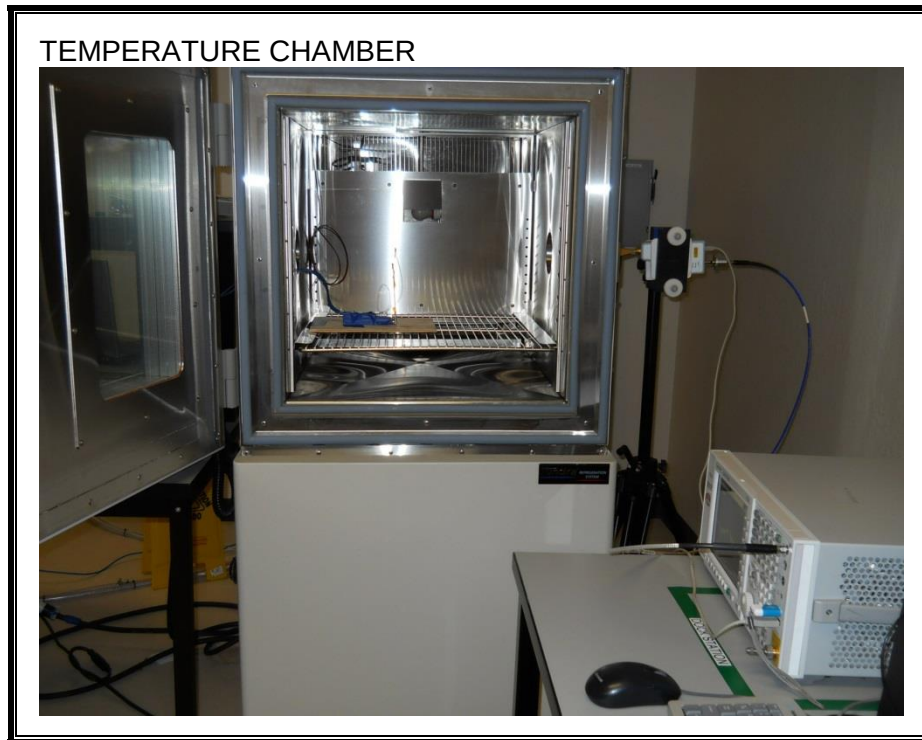
RADIATED FRONT PHOTO



RADIATED BACK PHOTO



FREQUENCY STABILITY SETUP

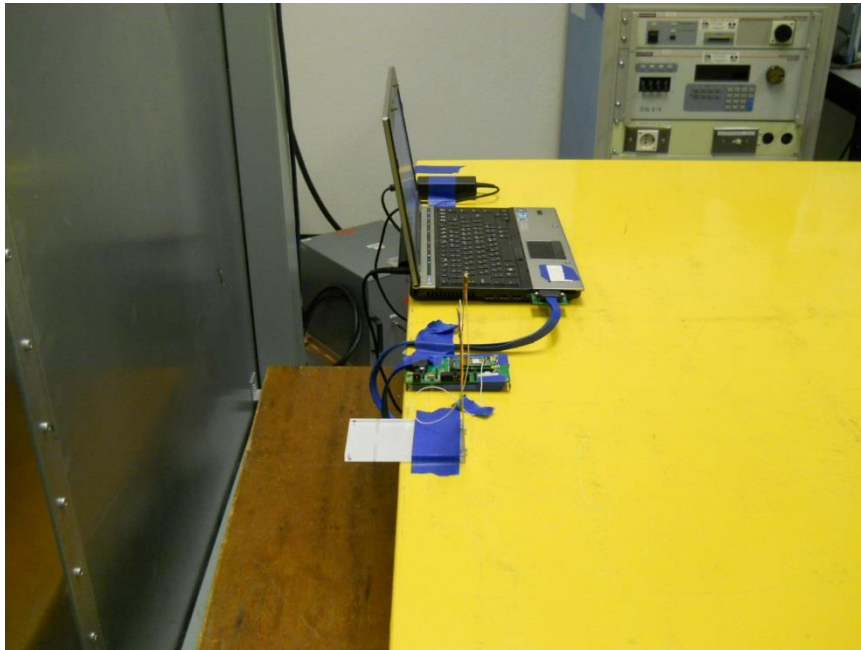


POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

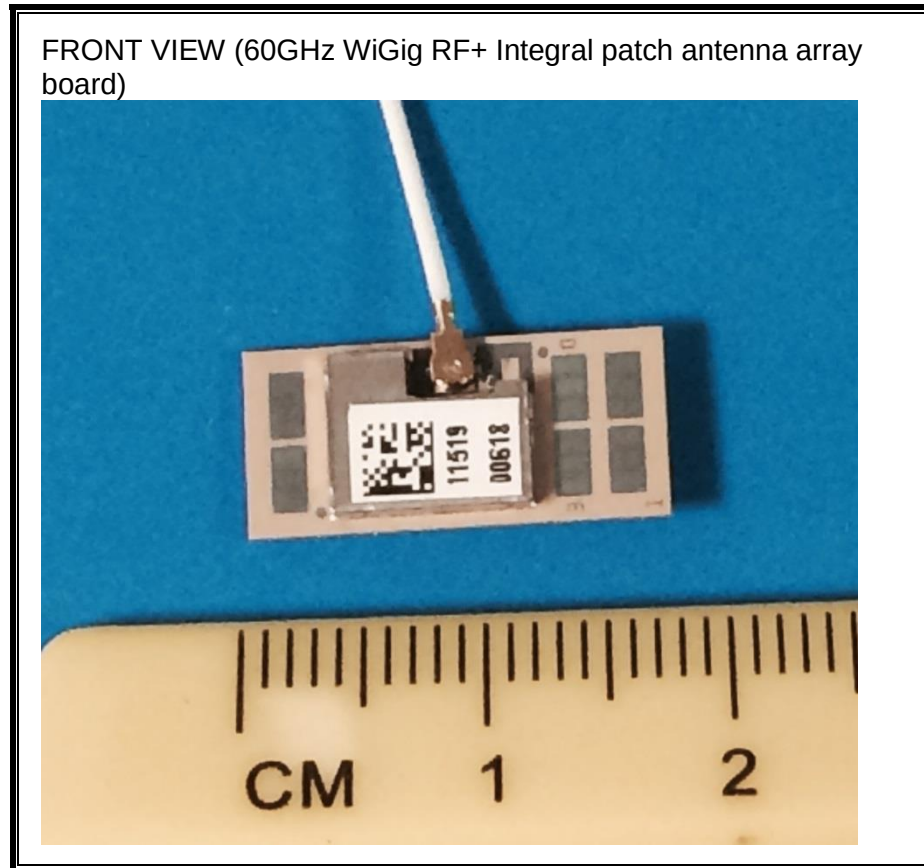


LINE CONDUCTED BACK PHOTO

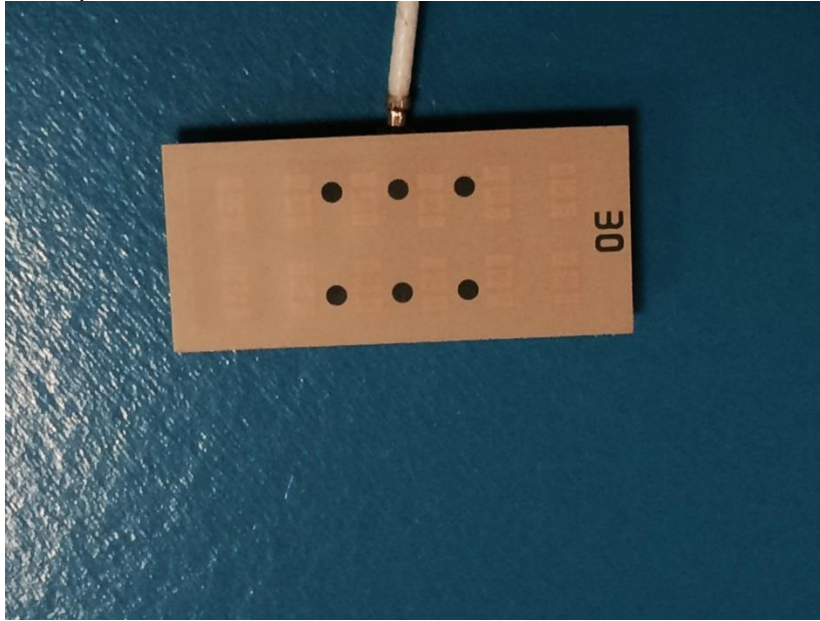


EUT PHOTOS

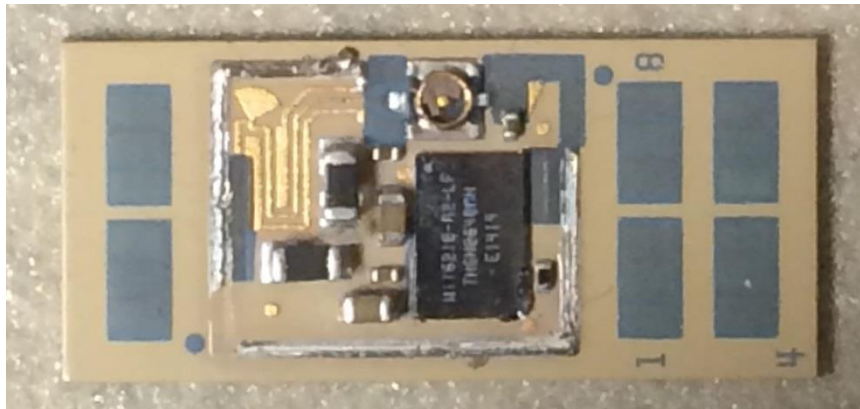
60GHZ WIGIG RF+ INTEGRAL PATCH ANTENNA ARRAY BOARD PHOTOS



BACK VIEW (60GHz WiGig RF+ Integral patch antenna array board)



INTERNAL FRONT VIEW (60GHz WiGig RF+ Integral patch antenna array board)



WiGig QCA9008-SBD1 M.2 1216 Baseband Board

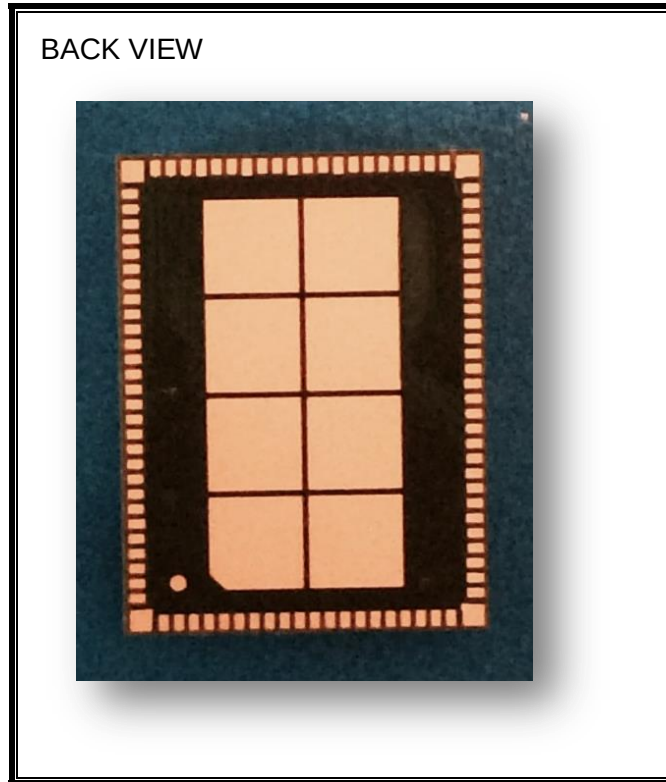
FRONT VIEW



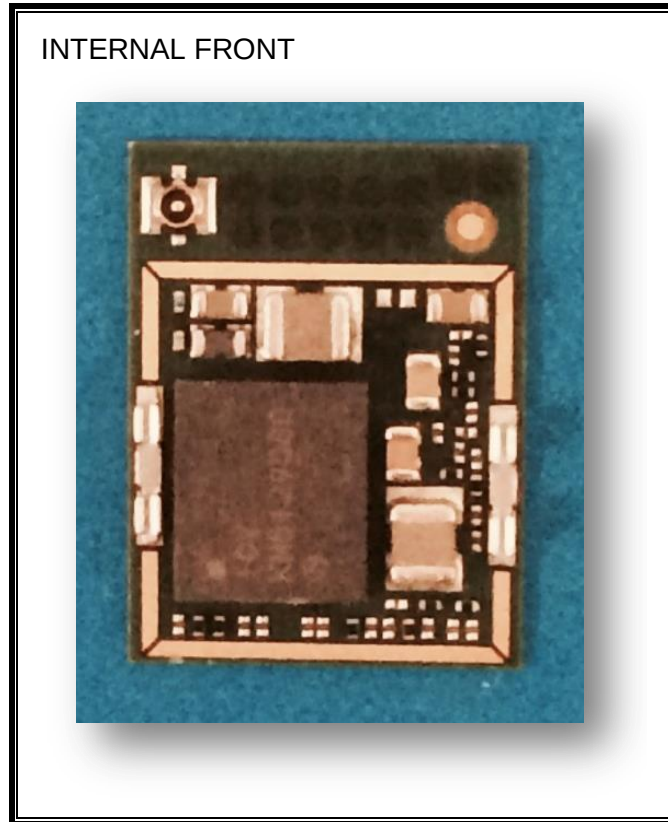
FRONT VIEW



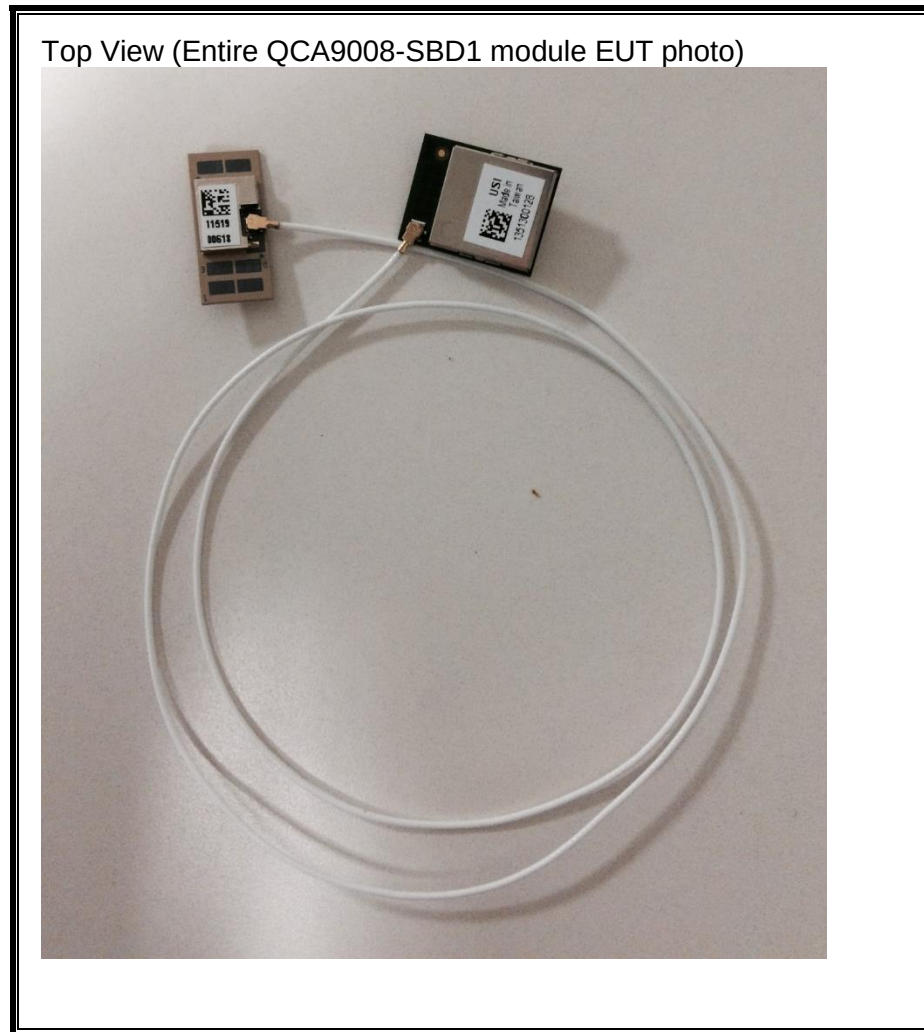
WiGig QCA9008-SBD1 M.2 1216 Baseband Board



WiGig M.2 1216 Baseband Board



QCA9008-SBD1 module (60GHz BB board and 60G RF board connected with coax cable) PHOTO



END OF REPORT